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NAVY PERSONNEL RESEARCH
AND
DEVELOPMENT CENTER
San Diego, California 92152

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INSTRUCTIONAL SYSTEMS DEVELOPMENT FOR P-3 AIRCREW TRAINING

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A new instructional system was developed for the 14 aircrew training tracks of the P-3 Fleet Readiness Squadron (FRS) training system. An instructional systems development (ISD) model was used to describe training requirements, to develop instructional materials, and to satisfy implementation and management requirements. This program arose because of the requirement that P-3 aircrew training be conducted in the face of restrictions in training resources, and the need to standardize training

being provided by the two P-3 FRSs. Recommendations are provided concerning the development and implementation of large-scale training programs using ISD methodology.

FOREWORD

This effort was conducted under contract with Courseware, Inc. in support of work unit 98WR98633 (P-3 Aircrew Training Improvement). It was sponsored by the Chief of Naval Operations (OP-594) and the Naval Air Systems Command (AIR-4133E). The objective was to develop and produce a revised P-3 Fleet Readiness Squadron (FRS) aircrew training syllabus, based on state-of-the-art instructional systems development (ISD) procedures.

The report describes the procedures involved in revising the FRS syllabus for all aircrew positions on board the P-3A/B, P-3B Mod, P-3C, and P-3C Update I & II aircraft. Related reports described the applicability of computer-assisted instruction to P-3 aircrew training (NPRDC Spec. Rep. 82-18), the relative costs involved in P-3 aircrew training (NPRDC Spec. Rep., in press), and the use of a subset of P-3 training objectives in evaluating media selection procedures (NPRDC Spec. Rep. 82-13).

This program could not have succeeded without the extraordinary level of support provided by the several commanding officers and the other personnel of Patrol Squadrons 30 and 31 and the Fleet Aviation Specialized Operational Training Group, Detachment Moffett Field, between 1975 and 1979. In particular, the individuals who served as subject matter experts and in support roles as members of the P-3 ISD Team provided assistance far beyond routine levels. Unfortunately, the number of individuals is far too large to list here.

The contracting officer's technical representative was Mr. Walter F. Thode.

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Commanding Officer

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Technical Director

SUMMARY

Problem

The two P-3 Fleet Readiness Squadrons (FRSs) required a new training syllabus that would make effective and efficient use of the 2F87(F) flight simulator and would produce well-trained crew members despite an imminent 23 percent reduction in flight hours. In response to a request from VP-31 that the existing aircrew training program be restructured, the Chief of Naval Operations (CNO) asked NAVPERSRANDCEN to develop a program for P-3 FRS aircrew training that would follow the guidelines set by the integrated training program previously developed for crew members of the S-3A aircraft. The Naval Air Systems Command (NAVAIRSYSCOM) was asked to provide funding for the effort.

Objective

The objective was to redesign, develop, implement, and evaluate a course of instruction for P-3 aircrew positions. This course would be adopted by the two P-3 FRSs and would result in a training program that would function effectively and efficiently within the existing and projected constraints of the P-3 FRS training community.

Approach

A team of subject matter experts (SMEs), instructional design/development specialists, and production personnel was assembled to carry out the design, development, production, implementation, and evaluation/revision of the P-3 aircrew training syllabus for 14 crew positions in four different versions of the P-3 currently in use. The instructional systems development (ISD) approach was used to accomplish the phases of the task.

Results

1. As a result of the implementation of the new syllabus, P-3 FRS aircrew training is occurring successfully despite a reduction in flight hours and the introduction of new flight simulators.

2. Instruction has been individualized as much as possible within the constraints of fixed resources and coordinated crew training, so that students can proceed at a rate consistent with their needs. Instruction is focused toward achieving specific instructional objectives that are tied directly to tasks performed by crew members on the job.

3. Training between the two P-3 FRSs has been standardized.

4. Documentation of all instructional components is available for reference and use by all concerned parties. Some phases were not as well documented as others, but the documentation that is available allows for determination of the basis for most decisions made about the content and structure of the materials in the P-3 master course syllabus (MCS).

5. A quality control system exists that permits systematic revision to the instructional material. The system requires more FRS resources than are normally available. However, use of an abbreviated version of the system has resulted in beneficial changes to the materials since implementation.

6. A management system is in operation that allows the instructional system to be integrated with all other components of the FRS mission.

7. Besides the training materials themselves, a substantial amount of system documentation was created as part of the effort. This documentation is available for examination at NAVPERSRANDCEN.

Conclusions

Numerous conclusions were reached concerning the efficacy of procedures used during each phase of the ISD effort. These conclusions may be useful to individuals involved in similar efforts.

Recommendations

1. In future ISD efforts, CNO and NAVAIRSYSCOM should consider separating the instructional design tasks (job analysis, competency analysis, media selection, and syllabus development) from the development tasks (authoring, production, and subsequent phases) and creating a two-phased approach to conducting instructional development of this scope. In this way, the extent of the development effort can be determined by using the results of the design effort, and resource availability requirements can be more accurately determined.

2. On an instructional development effort of this scope, it is not feasible for Navy organizations to supply all of the required subject matter expertise without crippling other operational requirements. Use of contractor-supplied SMEs who work with a small cadre of Navy SMEs should be considered.

3. On a project of this complexity, participants should dedicate personnel to the project for the entire development cycle or for as long as possible. These personnel should be selected for their ability to contribute subject matter or other expertise, and the time they spend on the project should provide a positive rather than a negative influence on career growth.

4. It is essential that the appropriate Navy organizations maintain a sense of responsibility for the success of the program since they will eventually lose contractor and other outside support. They must also share responsibility for accuracy of content and timeliness of project activities during the course of the project.

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INTRODUCTION

Problem

In 1974, the two P-3 Fleet Readiness Squadrons (FRSs), Patrol Squadron 31 (VP-31) at the Naval Air Station (NAS), Moffett Field, California, and VP-30 at NAS Jacksonville, Florida, established a need for a new aircrew training syllabus that would make effective and efficient use of the new 2F87(F) flight simulator and would produce well-trained crew members despite an imminent 23 percent reduction in flight hours. VP-31 requested that a program to oversee the restructuring of the existing aircrew training program be developed. In response, the Chief of Naval Operations (CNO) requested NAVPERSRANDCEN to develop a program for P-3 FRS aircrew training that would follow the format used in developing aircrew training courses for crew members of the carrier-based antisubmarine warfare (ASW) aircraft, the S-3A, which had recently been introduced to the fleet.

Objective

The objective of this effort was to redesign, develop, implement, and evaluate a course of instruction for P-3 aircrew positions that would be adopted by the two P-3 FRSs, using the systematic approach to the development of training called instructional systems development (ISD).

Background

In the past, the general tendency in developing training courses, training devices, and simulators has been to design them without considering the job tasks to be performed by the users. Training requirements were not always carefully analyzed and interpreted, resulting in inappropriate training content and ill-defined specifications for training equipment. Once the training equipment and/or courses were turned over to the user, there was sometimes little, if any, follow-up evaluation to ensure that they were used to their maximum capability. Training isolated from operational task was sometimes regarded as an end in itself. However, today, it is recognized that such isolation is inefficient and results in an inferior product.

The P-3 aircraft is a land-based, long-range ASW aircraft with the primary mission of patrolling the world's oceans for potentially hostile submarines. It operates out of several sites located within range of virtually all of the open-ocean locations in the world. Crew members include both officers and enlisted men. Prospective crew members receive initial training at a variety of sites, but all report to one of the two FRSs for final training in P-3 procedures and requirements before reporting to a fleet squadron to begin an operational tour of duty.

In the past, P-3 FRS aircrew training relied heavily on traditional methods of instruction. These included (1) group training experiences with emphasis on the lecture format, (2) some training in devices and simulators of varying degrees of complexity, and (3) one-on-one instructor-student experiences in flight training. However, because of the increasing complexity of crew jobs, coupled with the reduction in available flight hours and in personnel resources available for training, a more efficient training program must be adopted.

Instructional science has advanced to the point where the development of instruction need no longer be primarily an artistic exercise. Rather, it can be a systematic and methodical application of established procedures that can maximize the success of training. ISD, the instructional development method required by all uniformed services, offers the best opportunity for developing effective, efficient, and motivating instruction. This method, which employs a series of orderly, logical, and interrelated steps to produce training with a specific goal, is outlined in Figure 1. By analyzing tasks to determine the proper content of training and then specifying instructional objectives based on identified tasks, determining appropriate media, and developing, producing, and evaluating the instruction, training developers can ensure that training includes the knowledge, skills, and attitudes essential for successful job performance.

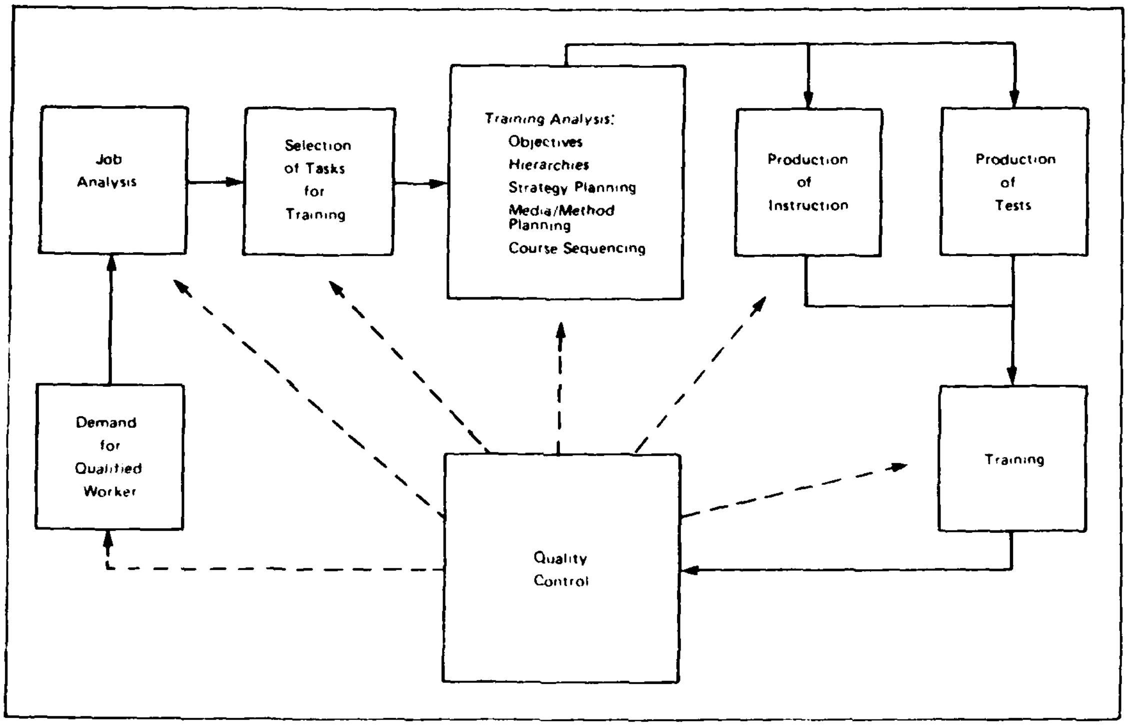

Figure 1. The instructional systems development process.

Staffing

A team of personnel was assembled at NAS Moffett Field, which remained the center of project operations. As the effort expanded, a second group was set up at NAS Jacksonville. Personnel involved included subject matter experts (SMEs) from VP-30, VP-31 and Fleet Aviation Specialized Operational Training Group Detachments at Moffett Field and Jacksonville.

APPROACH

The initial development effort was directed toward aircrew syllabus materials for positions on board the two existing P-3 models--the P-3A/B and baseline P-3C aircraft. However, during the development process, it was learned that modified versions of both models were to be added to the fleet's inventory relatively soon and that the instructional development effort then underway should be revised to include instruction incorporating the changes to aircraft systems. The P-3B Mod aircraft, the modified version of the P-3A/B aircraft, would include revisions of major components of existing P-3A/B tactical systems, including an on-board processor and largely different equipment for the naval flight officer, and sizeable changes in the sensor operators' jobs. This revised version was to replace the P-3A/B in some fleet squadrons but not in others. Shortly thereafter, the P-3C Update I, with a number of changes affecting most crew members, was due to replace the baseline P-3C in some fleet squadrons; and the P-3C Update II aircraft, a more extensively revised version, in others. Again, however, the baseline version would remain in the fleet's inventory. This meant that aircrew syllabus materials had to be developed for crew positions in four different versions of the P-3 aircraft. These positions are listed in Table 1.

Table 1

Aircrew Positions by Aircraft Version

Position	Aircraft Version	Abbreviation
Pilot	All versions	--
Flight engineer	All versions	FE
Naval flight officer	P-3A/B and P-3B Mod P-3C P-3C Update	B NFO C NFO C Update NFO
Acoustic sensor operator	P-3A/B and P-3B Mod P-3C P-3C Update	B SS-1/2 C SS-1/2 C Update SS-1/2
Nonacoustic sensor operator	P-3A/B and P-3B Mod P-3C P-3C Update	B SS-3 C SS-3 C Update SS-3
Ordnanceman	P-3A/B and P-3B Mod P-3C and P-3C Update	B Ord C Ord
Communicator	P-3A/B and P-3B Mod	B Comm

This section describes the ISD phases for the original P-3 models--the P-3A/B and baseline P-3C, followed by a description of the modifications necessary for the revised models.

ISD Phases for P-3A/B and P-3C Aircrew Training

The ISD phases consisted of job analysis, competency analysis, media selection, sequencing, lesson specification, production management, specification of the instructional environment, authoring, lesson materials production, implementation planning, and lesson validation. These phases are described below.

Job Analysis

Job analysis consists of defining the tasks to be covered in the training program. It was performed most efficiently by a team including one or more persons familiar with job analysis techniques and one or more SMEs familiar with the job being analyzed. The job analysis procedure used in this effort consisted of eight steps, as described below:

1. List the responsibility areas. Focus on the job, and determine, at the highest level of generality, the jobholder's major responsibility areas. Responsibility areas are those that (a) take up a major portion of job time, (b) are more or less independent of each other (the jobholder generally operates within only one responsibility area at a time), and (c) usually involve different equipment or procedures within each.

2. List the functions within one responsibility area. Focus on a responsibility area, and determine what end results or outcomes are possible within that area. The different outcomes will be functions. Functions are sets of activities within a responsibility area directed toward different end results, are more or less independent of each other in that the end result or output of one effort is not necessarily input to another, may involve use of similar equipment and parallel procedures, and can be performed by a team instead of by individuals.

3. Select a function and divide it into phases. Focus on a function, and determine the logical time slices or phases of the function. Phases occupy exclusive time slices of a function, have logical beginning and end points, are dependent in that the successful completion of one phase is necessary before beginning the next, and, when taken together, describe the entire function.

4. Mentally walk through each phase and list all tasks. Focus on each phase, and determine the major activities (tasks) a jobholder must perform within that phase. Major tasks are significant activities within a phase, have observable beginning and end points or result in consistent products, and usually include consistent sequences of specific behaviors.

5. Reorganize tasks so that all are at the appropriate level. If some tasks listed are actually combinations of major tasks, list each major task separately. If some tasks listed are time slices of a phase rather than independent activities, reexamine the phase and determine the activities the jobholder must perform. If some tasks can be subsumed under others, list only the major tasks.

6. Select next responsibility area, function, or phase. Until each phase of each function within each responsibility area has been analyzed, recycle through the procedure.

7. Identify additional tasks required to perform under extraordinary situations. Focus on each function and phase, and determine whether there are any conditions under which each is performed that require deviations from the normal procedure. Add whatever tasks are required by these conditions.

8. Validate the job analysis with available published information and review it with SMEs. Check the job analysis against available published information about the job and review the analysis with SMEs to ensure it is accurate and complete.

To validate the job analysis (step 8 above) and to obtain input for use in selecting tasks for training, air crew members at NASs Moffett Field, Jacksonville, Brunswick, Maine, and Barbers Point, Hawaii were surveyed. Appendix A provides a sample of the instructions given to participants and a summary of the responses to one section of the job analysis for the P-3A/B NFO that describes his duties as tactical coordinator (TACCO).

The data collected from the job analysis survey were analyzed to determine what tasks should be included in FRS training. For this analyses, the data are not treated in absolute terms requiring statistical analyses. Rather, they are used to "flag" a given task for further inspection. For example, disagreement among survey respondents about a given task alerts the SME to a possible problem. Thus, the survey data are one type of input, along with the SME's expert judgments, the judgment of colleagues, and various Navy publications. Using these sources, the SME makes several judgments about each task and applies them to the algorithm shown in Figure 2.

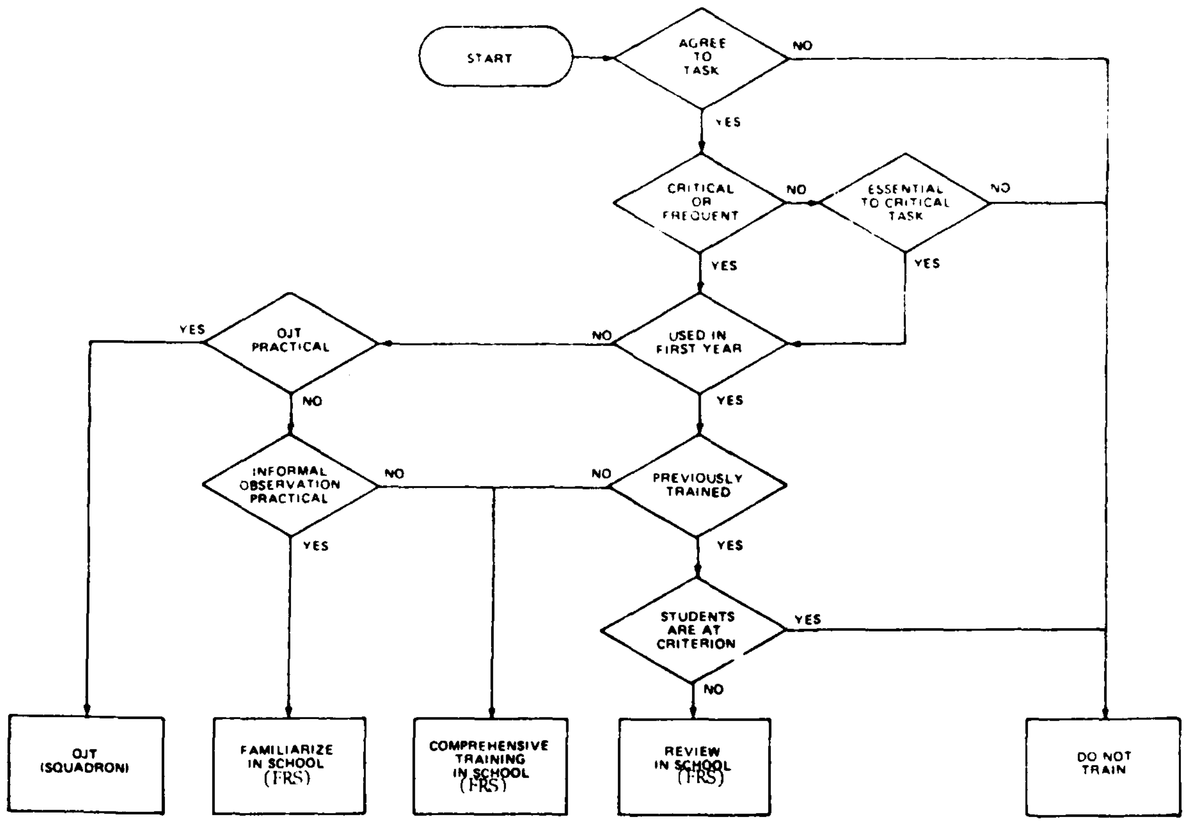

Figure 2. Algorithm for selecting tasks for training.

In this algorithm, which is a guide to assist in selecting tasks for training, diamond-shaped boxes indicate decision points while rectangular boxes indicate actions. Decision points are discussed below:

1. AGREE TO TASK permits tasks that were listed in the job analysis but rejected by respondents as not part of their jobs to be dropped.

2. CRITICAL OR FREQUENT allows tasks that are critical (necessary for completion of the job) and/or frequently used to be chosen. A task may be critical but infrequently used, as with emergency procedures. A task may also be judged critical because it is required by standard operating manuals (e.g., Naval Air Training and Operating Procedures Standardization (NATOPS)), even though it was rated low by most survey respondents.

3. ESSENTIAL TO CRITICAL TASK refers to a task that is neither critical or frequent. This is used to consider a task for training that may not be critical itself but is required to perform a critical task. Since these tasks become prerequisite to, or part of, the critical procedure, they are trained.

4. USED IN FIRST YEAR picks out tasks that might be trained on the job, since it is usually more efficient to train a task shortly before it is used.

5. OJT PRACTICAL is used for routine tasks not used in the first year after FRS training. It refers to on-the-job training with squadrons.

6. INFORMAL OBSERVATION PRACTICAL is used when formal on-the-job training in squadrons is not practical. If the answer is "yes," the trainee may be able to observe informally and learn a simple task from experienced job holders. In this case, the trainee needs familiarization in school to facilitate observational learning.

7. PREVIOUSLY TRAINED is used for routine tasks used in the first year. It refers to training prior to FRS.

8. STUDENTS ARE AT CRITERION is used for tasks that have been previously trained. Students who can perform the task to criterion enter FRS training already able to perform the task required on the job. Therefore, the recommended action for such tasks would be "do not train." However, some students may be inadequately trained, or may not have learned to perform the tasks as part of the larger job. Here, the recommended action would be "Review in School (FRS)."

<u>Competency Analysis</u>

Competency analysis (also known as hierarchical analysis) is the process of breaking down the tasks selected for training into the instructional objectives required to prepare a student to perform each task. The competency analysis procedure used on P-3A/B and P-3C tasks is depicted in Figure 3 and described below:

1. <u>Write terminal objectives for all major tasks and goals</u>. In the competency analysis, which involves analyzing major tasks and goals into their components, it is necessary to have a complete specification of what the learner is expected to do. In other words, an instructional objective is needed for each major task or goal. The specific conditions under which a task or function is performed, the precise behavior, and the standards that must be met all affect what the learner needs to know to perform satisfactorily.

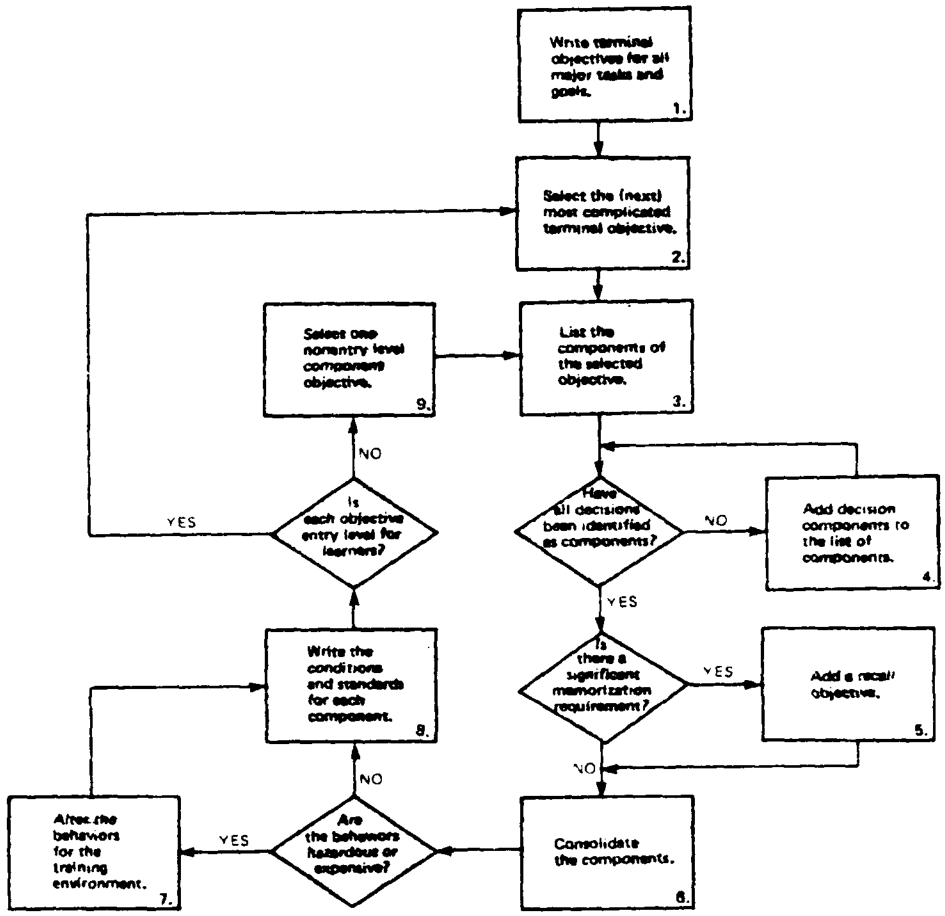

Figure 3. Competency analysis flow chart.

2. Select the (next) most complicated terminal objective. An objective should be selected that involves a considerable amount of time, requires many subprocedures, or tends to be most difficult. This helps to ensure that no terminal objectives are really components of others. Also, it will often lead to identifying the component areas that are common to more than one terminal objective.

3. List the components of the selected objective. Components are those objectives that learners must master before they can master the terminal objective. Components are determined by examining the behavior, standards, and conditions of the terminal objective and asking what a learner needs to be able to do to perform the exact behavior under the conditions and standards specified.

4. Ensure that all decisions have been identified and added as decision components to the list of components. Wherever a decision is necessary, learners need to know how to make that decision. Therefore, an objective should be included specifying that behavior. Learners are likely to be called upon to make a number of decisions such as determining when to perform a rule or procedure, which of several rules or procedures to use, and whether their own performance is adequate.

5. If there is a significant memorization requirement, add a recall objective. Wherever learners must be able to recall steps, operations, or characteristics in order to perform, a recall objective is necessary to ensure that they do learn to recall the material. Recall objectives are usually needed when learners must remember a lot of information in order to perform and when a job aid is either unavailable or impractical.

6. Consolidate the components. In this phase, the list of components is examined to see if any can be eliminated. Components that a learner can easily do without instruction, that are not necessary to accomplish the objective, or that are actually subcomponents of others listed are deleted. Components that are not substantial enough for individual instruction but require similar behaviors applied in slightly different situations are consolidated. Finally, the list is reexamined to ensure that learners will be able to perform the objective.

7. Determine if the behaviors are hazardous or consume expensive resources. Tasks that cannot be performed during training because they are hazardous or consume expensive resources should be identified so the components written for them will be an approximation of actual performance. For example, it would be too dangerous and too expensive for student pilots to practice making emergency crash landings without landing gear in a real aircraft. For this reason, learners might be required only to remember the procedure. The objective would be: "State the steps in making an emergency landing with landing gear failure." This situation might also be handled through simulation.

8. Write the conditions and standards for each component. The procedure for this step is the same as the procedure for Step 1. If some behaviors have been identified as hazardous or expensive, the conditions of those objectives should reflect the limited circumstances.

9. Select one nonentry-level component objective. Select one of the component objectives that will need to be broken down further for the average learner. Work the objective through the steps in the flowchart until you get back to this step. Choose another nonentry-level component objective. Cycle through the flowchart until all the objectives are entry-level components for the intended audience.

One component of the competency analysis was a graphic diagram of the hierarchies of objectives in each crew position. Conventions were established for page numbering, cross referencing of tasks, determining an appropriate level of task detail, dealing with missing tasks, etc. This procedure allowed the use of standard conventions that reduced confusion and enhanced the communication among SMEs and between them and instructional technologists. The diagramming of objectives resulted in good documentation of the objectives on which course material would be based.

The goal of the competency analysis was to identify all objectives required to take students from their entry point in the program to a level of proficiency that would enable them to perform adequately on the job. It was necessary to structure higher-level objectives accurately with respect to each other and to identify the necessary lower-level objectives and ensure their consistency and completeness.

As the number of objectives proliferated, changes to specified procedures occurred. For example, it became increasingly important to standardize the format of objectives and to track their development. Since a standard method of numbering became crucial, a system was instituted to ensure that all new objectives were kept clearly associated with their relevant upper-level tasks. Although several tracks included common patterns of objectives (e.g., functions, locations, and operation of equipment had to be taught as standard introduction to each new major piece of aircraft equipment), time was lost before this approach was adopted across all tracks. Conceptions of tasks determined previously were often modified after consideration of enabling objectives. As a result, it was necessary to ensure that a master copy of the competency analysis for each aircrew position was kept up to date with changes, and that these changes were noted in the job analysis.

Media Selection

A media selection algorithm was developed based on the one used in developing the FRS training syllabus for S-3A crew members, and selection of media for each track began as soon as competency analysis was completed. The purpose of the media selection process was to determine an instructional medium that was both appropriate for delivering instruction to students and specific to the content of each objective. The algorithm that was used resulted in the selection of a recommended medium as well as alternative media choices in the event that the first choice could not be implemented due to scheduling or other constraints. The media selection algorithm is described in Appendix B.

Althouh it was originally intended to computerize the media selection algorithm, it became evident that the resources necessary for data entry were unwarranted; the algorithm was used manually on each instructional objective. Workshop sessions were conducted to train SMEs to participate in media selection and written guidance on procedures was provided for reference purposes. A special form, shown in Figure 4, was created to standardize and document the media selection process.

One of the results of the media selection process was a determination that computer-assisted instruction was the first choice for a large number of objectives. However, since this option was not available due to cost constraints, second-choice media were chosen.

As work proceeded in subsequent phases, some media selections had to be revised to make the chosen media consistent within a particular lesson. As soon as the sequence of segments in a lesson was set, final media determinations were made for each lesson. The final media alternatives selected included text, lectures/seminars, slide-tape, and videotape, as well as the existing training devices and aircraft. Once the media were selected, planning could begin for developing the instruction.

Sequencing

The initial development of the syllabus for the P-3A/B and P-3C aircrew training courses involved the proper sequencing of aircraft flights, training device sessions, and classroom lessons, and included the designing of lesson maps. Although lesson maps were originally intended for eventual inclusion in completed lessons, the decision was subsequently made to exclude them for reasons of economy. The result of the sequencing process was a course syllabus and a set of lesson maps for each track. Taken together, the individual course syllabi constituted an overall master course syllabus (MCS). This preliminary MCS included all components required in the individual courses but did not yet

OBJECTIVE NO. 5.4.6.3.1
MAJOR TASK IDENTIFIER 5.4.6

EST. LEARNING TIME 25 min.
ANALYST Ed Jones
DATE 9/12/78 PAGE 5 of 20

COURSE
PHASE
UNIT
LESSON

CHECK	REQUIRED CHARACTERISTICS		ACCEPTABLE MEDIA — STUDY SESSION	HANDS-ON	
	Display characteristics				
	Audio		Workbook		A
	Line drawings		Workbook with color photographs		B
✓	Black & white photographs		Lecture & wkst		C
	Color photographs		Lecture & wkst & overheads/slides		D
	Visual motion		Lecture & wkst & audio tape		E
	Tactile sensations		Lecture & wkst & slides & tape		F
	Spacial layout		Lecture & wkst & VT		G
	Movement sensations		Lecture & wkst & model		H
	Student response requirements		Audio tape & wkst		I
✓	Verbal or written		Slides & wkst		J
✓	Point, touch, or mark		Slides & audio tape & wkst		K
	Manipulate hardware (2 D)		Random access slides & wkst		
	Manipulate hardware (3 D)		Videotape & wkst		
	Response detection and evaluation:		Film & wkst		
	Student self observation	✓	CAI		
	Direct instructor observation	X	CAI & wkst		
	Delayed instructor evaluation & scoring	X	CAI & wkst & VT		
✓	Automated right/wrong scoring				
✓	Automated tolerance data collection				
	Feedback requirements				
✓	1 Written or verbal				
	2 Branch to new display				
	3 Real time interaction				
	4 Performance playback				

COMMENTS

BEHAVIOR:
Classify Nav Radar displays as to topographical characteristics, land/water distinctions, and cultural density

CONDITIONS:
Given a representation of a static radar display

REQUIRED EQUIPMENT:
None

STANDARD:
Determinations made within 10 seconds, and with 95% accuracy.

ALTERNATE REFERENCE NO.:
8.6.3.4,

Figure 4. Sample media selection worksheet.

include the scheduling and apportionment of available resources among tracks so that each track had the required resources available at the appropriate time.

To sequence segments of instruction within a particular track, it was first necessary to identify those segments requiring the use of training devices, aircraft, and other limited resources, and then to determine which devices were required, for how long, and at what points in the syllabus. For example, in the case of the NFO, pilot, SS-1/2, and SS-3 crew positions, it was necessary to determine where coordinated weapon system trainer (WST) use was required and then to ensure that each track included the same WST sessions at the same times. The detailed sequencing procedures are described in Appendix C.

The results of this sequencing were used as the input for the final coordination of all instructional components into the MCS. In this process, the individual syllabi were meshed into a schedule that ensured the availability of the necessary resources (aircraft, trainers, classrooms, media equipment, and personnel) to each trainee as his syllabus required it. As more precise data became available during development of instruction, continued refinement occurred in the MCS. Revision to individual syllabi was required because of coordination requirements among crew members and scheduling conflicts with other operational requirements.

Lesson Specification

A format for lesson specification was developed. The purpose of lesson specification was to provide a blueprint for instruction that could be expanded into the final instructional materials. The SME writing the lesson specification took a previously defined objective and followed a standard procedure to complete the specification. Three types of procedures were developed, and each had its resulting document:

1. Lesson specification document (LSD). The LSD was the primary means for defining study lesson materials. Appendix D provides a detailed discussion of LSD components and includes examples.

2. Media strategy document (MSD). When the instruction required videotape or slide/tape, the two media choices for classroom presentation besides text and lectures, the MSD was added to the basic LSD to indicate the flow of the presentation. The MSD included a sequential outline narrative and visualization as well as remarks on the relationship of the videotape or slide/tape material to accompany workbooks or lectures. A sample MSD is provided in Appendix E.

3. Device session guide (DSG). Training device sessions did not require an LSD. Rather, they were designed using the DSG, which described the purpose of the session, as well as the basic flow of activity, and indicated precisely how the student would be evaluated. An example of a DSG is included in Appendix F.

Production Management

Once the specifications for study lessons, training device sessions, and media strategy began to accumulate, the need for a more comprehensive management system of all components became evident. Two important elements of this system were (1) tracking the lesson specifications and device sessions throughout the production process, and (2) coordinating instruction that is common to several courses. A number of production management and tracking procedures were instituted to assist in this process. As key production personnel requirements were identified, personnel were brought on board to assist in further production planning and to begin work on the development and production of instruction. The production shop was established, and production procedures and formats were developed.

Specification of the Instructional Environment

Plans were required for the environment in which the new syllabus would be taught as soon as the media and lesson strategies became known. Training devices and other equipment were known instructional resources, but the nature of classroom training had to be specified.

The requirement of individualized training for classroom activities focused the instructional environment toward a learning center instead of the more traditional group activities such as lectures. A learning center was viewed as an environment in which students worked individually, each at his own pace. Instructors were always to be available if a student required assistance. Specification of this environment meant that facilities for such an environment had to be made available.

The facilities had to include (1) spaces for the expected student load at each FRS site, (2) required check-in/check-out facilities to allow students access to each new instructional component as they completed the previous one, and (3) the necessary media devices for delivering the instruction. Space for the requisite student load was identified, and check-in/check-out areas were designated. Some use of existing spaces was possible, especially at NAS Jacksonville, but new spaces had to be constructed at Moffett Field and existing spaces at both sites had to be modified. Media devices specified for procurement included videotape and slide-tape playback equipment. In addition, carrels, or individualized learning spaces specifically designed for videotape, slide-tape, and text materials use, were specified for inclusion in the learning centers.

Authoring

The SMEs and instructional technologist authored materials from the LSDs. After instructional segments from the first LSDs had been developed, it became clear that the LSD process as envisioned, while resulting in complete and accurate instruction, was too inefficient to permit completion of the required instruction for all tracks with the resources and time available. Efforts were focused toward identifying a method of authoring more or less directly from the objectives hierarchies and sequences. An alternative was adopted that included the use of unit planning conferences.

Unit Planning Conferences. Using this process, authoring began with a meeting between the instructional technologist and the SME(s) for a particular training track. These conferences included all personnel involved in the development of lesson content for a given unit, and included other available subject matter expertise. During these meetings, lesson content was specified, and authoring responsibilities were assigned to each team member.

Unit planning conferences typically were held at the beginning of each new unit and involved the discussion of all objectives for the lessons and segments in the unit. During these meetings, objectives, content, and media were used as the basis for authoring decisions and assignments. The lead SME (who in most instances worked on the original specification of objectives and/or course syllabus, and was also the senior SME of the group) was often able to assist in making the jump from these source materials to the lesson content. The outcomes of these meetings were clearly delineated objectives, directions for the strategies to be taken in authoring the components of the lessons, and authoring assignments for each segment. These conferences not only provided valuable, cohesive direction for authoring, but also helped overcome the "not invented here" syndrome that often is a problem when SMEs deal with each other's work. This syndrome had previously resulted in numerous changes in content and approach of previous work phases. During the unit planning conferences, it was also possible to involve particular FRS staff members with special expertise when a topic required it.

The greatest deficiency in this revised process was the inability to document fully the decisions and rationale that went into the development of the lessons. This deficiency will have an effect on the ease of revision of the instruction as the need for revisions occurs in the future.

Authoring procedures. An individualized author training course was used to train SMEs in authoring procedures and conventions. This 3-day course included a brie introduction, a set of project terms, abstracted versions of sample lessons like the one SMEs would author, conventions for writing, formats, abbreviations, and practice on doing all of the tasks involved in authoring. At the conclusion of training, all SMEs had produced an initial lesson that could then be incorporated into their tracks. More importantly, they were then ready to author further lessons with a minimum of over-the-shoulder guidance.

In some instances, actual fleet practices were seen as varying from official NATOPS procedures. In these cases, "author notes" were incorporated to indicate this difference, while highlighting regular NATOPS procedures. Also, technical changes were being introduced inadvertently after SME drafts were completed and sent for format and editor checks. A better system of checks of content was instituted. As a result, a SME check of content was incorporated as the final step before production was to begin on any lesson.

Personnel issues. As authoring progressed, it became increasingly important to ensure adequate content input and review from VP-30 to ensure that instruction was meeting their distinct needs. In addition, there were shortages of authoring personnel if the scheduled implementation were to be met, despite the sizeable commitment of VP-31 personnel resources to the effort. To solve both of these problems, training objectives were divided between the two FRSs for authoring. In most cases, this resulted in the collocation of the lead SME and author at VP-31; in other instances, the authors were from VP-30 but the lead SMEs were at VP-31. Because of the need for review by both FRSs, a system of transmittal of classified documents was created. In addition, schedules for telephone communication were set up to allow for increased interaction despite time zone differences.

At the same time, the use of short-term personnel was initiated to fill authoring and review needs. These temporary SMEs were assigned to certain tracks for interim tours that ranged from several weeks to 6 months. It was often difficult for these SMEs to get fully "up to speed" as authors. Due to the acute need for personnel, however, the contributions of these individuals were essential. The self-paced author training course permitted efficient training of these SMEs, and additional review of their work was scheduled to ensure sufficient accuracy in lesson content and format.

Lesson Materials Production

Production of text lesson materials and device session guides began as materials became available from authoring and editing. Production included word processing and proofreading and involved development of required art work, headers, tables, and other graphics functions. When both text and graphics materials were completed, they were pasted up onto master flats. All text materials required a final SME sign-off before reproduction.

Slide-tape production began as soon as media strategies were laid out by the SMEs and instructional technologists, with input from the production personnel who would be involved. An outline of the slide-tape program was prepared, and all resources required were identified and scheduled. Art work required for some slides was developed and the completed art work and the required live action were photographed to create master slides. Videotapes were produced from media strategy documents prepared by the SMEs and instructional technologists. The process was similar to that described for slide-tape production during the planning phases.

Inevitably, it was found that some completed materials contained errors. Errors that were not caught before reproduction had to be corrected afterwards. The cost of revisions at this point was prohibitively high. The inauguration of an addendum system, which allowed SME-identified changes to be entered in a master copy of each lesson for inclusion in a later reproduction cycle, aided the correction process somewhat. Most of the SME-identified changes were text changes; in each case, an interim change page was inserted in reproduced text lessons to alert students and instructors to the change.

Implementation Planning

Implementation planning included development of formal plans for management of the instructional system once the new materials were finished and implemented, establishment of revision and system maintenance procedures for the changes that were sure to be required, and development of training and familiarization materials for instructors and students who would use the system. These materials are described below.

1. P-3 instructional system management plan. Development of a management plan began early in the project and continued for more than a year. Initial versions of the plan were developed and then revised continuously over a period of many months as more information became available concerning the final structure of the instructional system. Revisions were made by a variety of Navy and contractor personnel to ensure that all relevant aspects were included. Several drafts were circulated to incorporate comments from as wide an audience as possible. The final version of the plan was incorporated by the commanding officers of both P-3 FRSs as command policy. Revisions to the plan continued after implementation and will be required as long as the instructional system is in operation.

2. Quality control plan. The quality control plan specified the data to be collected and the analysis procedures to be employed to determine what changes had to be made to the instructional materials and the instructional system to increase their effectiveness. The plan was reviewed by personnel who were likely to be affected by the procedures outlined in it, and revised as necessary. The plan was incorporated as part of the management plan during system implementation. Initial experience indicated that the quality control plan specified more data collection than could be accomplished with the available resources in the FRS. A scaled-down version was informally adopted for long-term use.

3. Instructor training course. The objective of this course was to prepare existing instructors and those to be assigned in the future to operate within the new instructional system, since its characteristics differed from the Navy training environments that most instructors had experienced. Close coordination with squadron instructor under training (IUT) personnel ensured that the course included their suggestions and would fit into the

existing instructor training structure. However, since the course was not implemented systematically in the IUT syllabus for each track, some instructors were better prepared than others. Since experienced learning center instructors were not available to serve as models for the initial cadre of instructors, they were taught some of the techniques that can be used in individualized learning environments. Many instructors fared better when they were able to apply the techniques in on-the-job experience, and initial steps were taken to include more on-the-job experience in the course.

4. Student familiarization handbook. The objective of this handbook was to assist students in working within an individualized learning environment, since most are not given instruction in this form in other Navy training they receive.

Lesson Validation

A sample of lessons in each track was validated using small groups of students. The purpose of these tryouts was to collect information about students, instructional materials, and presentation procedures. The results of these tryouts were used to correct problems with the materials and procedures before full-scale implementation.

A representative sample of modules was originally scheduled for tryout. However, less than 5 percent of the materials were actually tried out, due to development and production delays and the difficulty in obtaining good validation subjects. Ideally, validation subjects are similar to students who will eventually use the materials but not subject to the same consequences if they do not perform adequately. In addition, subjects must be ready for the module scheduled for tryout but not already trained on the information in the module. These constraints limited the P-3 validations to the use of students currently in the training program who had to use the tryout sessions as the only training they would receive on the subjects included.

ISD Phases for P-3B Mod and P-3C Update I and II Aircrew Training

Instructional Design/Development

P-3B Mod. Job analysis, competency analysis, media selection, and sequencing of P-3B Mod instructional materials took place as information about the revisions included in that aircraft's systems became available. The SMEs from the training tracks involved (NFO, SS-1/2, SS-3, and Comm) identified the requirements specific to the revisions and development of materials for these revisions was begun.

The analysis process conducted at this point was somewhat different from the original analysis since much more information was already available. Instead of repeating the analyses for the P-3B Mod aircraft from the beginning, only areas of difference were addressed. In some cases, it was necessary to go beyond in-house SME staff to get information, since most ISD SMEs and other FRS personnel had not yet seen the new equipment. Job tasks were compared with the existing job analysis, and new tasks were included in a separate list. Objectives and media selections were done for each job task on the list, a revised instructional sequence was developed for each affected track that included the new objectives, and authoring of instruction then occurred as before. The analyses were completed in time to include most of the new syllabus components in the same unit planning conferences with the existing syllabus components.

P-3C updates. When notification of impending revisions to P-3C aircraft systems was received, work began to include the revisions into the developing instructional system.

The new P-3C Update I aircraft were to be introduced at NAS Moffett Field; and the more extensively modified P-3C Update II aircraft, at NAS Jacksonville.

The process used for analysis, media selection, and creation of a syllabus for aircrew training in the P-3C Update I and Update II was similar to that used for P-3B Mod instruction, but took less time because of increased experience. As before, only those items that differed because of new equipment and/or procedures in the two new P-3C aircraft versions were addressed.

Authoring and Production

The process for authoring materials for aircrew training in the P-3B Mod and P-3C update aircraft was identical to that used for the baseline P-3C aircraft materials. In the case of the P-3C updates, an attempt was made to introduce most minor items of update-specific information into existing lessons so that P-3C baseline and update students could use the same lesson, with the aircraft-specific information broken out separately within the lesson as required. This effort resulted in a small number of update-unique lessons and a large number of common lessons. This conserved quantities of lessons, storage space, and issue time. This process was not followed with the P-3B Mod lessons because the users were to be located separately from users of the P-3A/B lessons.

Lesson production began during production of P-3A/B and P-3C baseline lessons, and was identical in all respects.

Implementation, Evaluation, and Revision

Implementation of the entire P-3 training program with students in all tracks began at Moffett Field. Problems were encountered because the learning center facilities were not completed, the materials sometimes were not available until just before the students needed them, and the instructors were not prepared to operate in the degraded mode. As implementation continued, SMEs did not have enough time to analyze evaluation data completely since they were working to get the remaining unfinished lessons ready for initial use by students. Analysis of the data most important for making revision decisions was given priority to make best use of limited SME time. Instructors were asked to provide more input in defining changes required in materials. SMEs combined evaluation data from individual students, and generated revisions based on these data. The SMEs reviewed instructor comments, student performance data, the time requirements for materials completion, and the materials themselves to determine required changes. All changes were indicated on a master copy of each lesson and the lesson was sent back through appropriate reviews and into the production cycle again. After initial implementation, many months were required to iron out most of the "bugs" in the system.

RESULTS

Training System

1. As a result of the new syllabus implementation, P-3 FRS aircrew training is occurring successfully in spite of a 23 percent reduction in flight hours and the introduction of new flight simulators.

2. Instruction has been individualized as much as possible within the constraints of fixed resources and coordinated crew training, so that students can proceed at a rate

consistent with their needs. Instruction is focused toward achieving specific instructional objectives that are tied directly to tasks performed by crew members on the job.

3. Training between the two P-3 FRSs has been standardized.

4. Documentation of all instructional components is available for reference and use by all concerned parties. Some phases were not as well documented as others, but the documentation that is available allows for determination of the basis for most decisions made about the content and structure of the materials in the MCS.

5. A quality control system exists that permits systematic revision to the instructional materials. The system requires more FRS resources than are normally available, but use of an abbreviated version of the system has resulted in beneficial changes to the materials.

6. A management system is in operation that allows for integration of the instructional system with all other components of the FRS mission.

Training Products

Table 2 summarizes the training materials developed during the effort.

Other documents developed during the effort and available for examination at NAVPERSRANDCEN are the P-3 Job Analysis Document (7 volumes), P-3 Hierarchical Analysis (11 volumes), P-3 Master Course Syllabus, P-3 Instructional Systems Management Plan, P-3 Quality Control Plan, P-3 Instructor Manual, P-3 Student Guide, and P-3 SME Training Course. Small quantities of each document, coupled with limited reproduction capabilities, restrict wide distribution of these materials.

Table 2

Summary of P-3 Training Materials

Aircrew Position	Number of Objectives	Syllabus Components: Lessons	Tests	Video Tapes	Slide Tapes	Device Sessions	Syllabus Hours: Learning Center	Device Sessions	Static Aircraft	Aircraft Flight
Pilot[a]	1000	127	13	30	6	46	248	85	--	95
Flight Engineer	413	61	11	18	4	35	265	102	18	112
B NFO[a]	843	97	18	4	5	36	252	69	21	70
C NFO[a]	869	128	23	16	6	38	386	74	27	54
B SS 1/2	575	63	14	12	7	41	236	89	20	36
C SS 1/2	605	67	14	10	6	42	224	86	35	30
B SS 3	298	40	5	12	5	34	98	52	26	70
C SS 3	366	52	16	14	12	36	154	68	25	70
B Ord	199	27	6	8	5	24	44	--	38	24
C Ord	209	26	6	8	6	22	40	--	50	24
B Comm	345	38	9	6	14	37	130	--	69	30
Total	5722	726	135	138	76	391	2077	625	329	615

[a]First tour only.

DISCUSSION AND CONCLUSIONS

SME Training

While it was necessary to give SMEs a brief overview of the entire ISD process initially, it was more important to train and work with the SME on the current task he was performing. SME turnover on a large ISD project does not permit training SMEs capable in all areas of instructional development. The focus must be on developing skills in a particular phase.

A SME training manual, organized by tasks and referenced to other documents, was an efficient approach to SME training when supported by assistance from experienced project personnel and when continuously updated as procedures changed. The inclusion of a job aid containing terms, acronyms, conventions, and other information pertinent to the job of an SME was beneficial.

Job Analysis

Tasks omitted from the job analysis by oversight or lack of careful consideration may not be recognized as omissions until the training program is completed and in use. Also, if the processes of originating and verifying job tasks are not done with care, the jobs may be poorly or inaccurately stated and result either in extra work later to make corrections or in inaccurate or inappropriate tasks being trained. For these reasons, it is essential that the job analysis tasks be compiled with extreme care.

A continuing problem in conducting job analysis surveys is the time it takes for fleet squadron personnel to complete such surveys. Answering individual survey items covering an aircrew job tends to be a time-consuming process that requires substantial thought by respondees. In addition, the preparation of the survey instruments and the administration of the survey requires a sizeable investment of time and resources by the ISD team.

Competency Analysis

The inclusion in competency analysis procedures of hierarchical maps of objectives was useful in tracking hierarchical relationships, but too much time was taken to develop elaborate maps, causing less time to be available for vital subsequent activities. Computer support in the development of lists of objectives and in the construction of objective hierarchies would have saved large amounts of time.

Media Selection

Media selections were not made entirely on the basis of instructional suitability. The media decisions had to take into account resource availability, expense, scheduling, and motivational capabilities. Early recognition of the driving nature of these constraints can simplify the media selection process.

Common patterns of media requirements can be identified early in the media selection process to shortcut the use of the entire algorithm in every case. This becomes significant with a large number of objectives to be examined, and with a complex media selection algorithm like that used here.

Sequencing

The complexity of the process required to develop an MCS, coupled with the size of the P-3 program, required the assignment of a Navy individual who had the development of an MCS as his primary responsibility. He had to work with all tracks to ensure their courses' needs were being met, and to constrain their efforts when proposed course components would not fit into the overall MCS framework. He also had to maintain close contact with other squadron departments in both FRSs to provide them information about the evolving MCS, and to determine resource and other limiations.

Lesson Specification and Authoring

The development of LSDs proved inefficient when the same SMEs developed the LSD and authored the lesson. However, the documentation chain was broken when the decision was made to modify the lesson specification process and eliminate LSDs.

Design and development are more efficient and effective when a number of SMEs are involved, one of whom has authority for the content of the training track. This permits a diversity of views to be expressed, and allows the inclusion of individuals with particular areas of expertise. The designation of a senior SME with final decision-making authority leads to smoother SME team functioning.

Unit planning conferences helped lessen the negative impact of moving from LSD development to direct authoring, and proved to be an efficient method of using the available resources and meet the scheduled completion dates. The penalty of a lessened documentation trail must be accepted if this method is chosen, unless care is taken to document the conferences in a meaningful way.

Production

Production lead time was shortened by having a small production group generate alternative formats and associated costs early in the project. These alternatives could then be submitted to decision makers to allow final decisions to be made before the production process had begun. This also allowed the consideration of production constraints in development process planning.

The timing of production staffing and equipment acquisition can lead to inefficiencies if planning is not done with care. Time required for production is easy to underestimate because of a variety of factors including equipment problems, slower than expected review cycles, vendor problems, content changes during the production cycle, and absences of key people.

The dollar and time cost of making revisions after material was in production proved to be a significant problem. Measures that can be taken to minimize the necessity for revisions subsequent to the onset of production are of great value.

Implementation, Evaluation, and Revision

Instructors preparing to operate for the first time as learning center instructors did not have the opportunity to observe learning center operations before working with students, and thus did not fully understand the learning center instructor role. It would have been worthwhile to include a component of instructor training that provided some introduction to that environment. Observation of outside learning center operations might have been of value; a simulated learning center component of the instructor course might also have helped.

A major difficulty with validation of the lessons before implementation was the availability of validation subjects. P-3 validation subjects were students currently in the training program who were required to learn the information within tight time constraints. This did not allow an adequate number of tryouts or adequate data collection. Validation in a fleet setting with external constraints such as this may not be feasible.

A majority of revisions were technical content changes due to errors in the original lessons or to changes in the content occurring subsequent to authoring. Many changes were editorial, but only a few were instructional in nature. Content and editorial errors were relatively easy to correct, but instructional design errors were much more difficult both to identify and to correct.

Program Management

Neither the Navy nor the contractor consistently provided personnel with optimal levels of experience in their areas of expertise. This resulted in significant inefficiencies in the development of the training program. In retrospect, it was not feasible to expect the Navy to consistently provide personnel with the best qualifications when such a large number of individuals was required. It is important, however, that personnel in key positions (for example, lead SMEs and individuals in charge of major components such as the MCS) be as highly qualified as possible, and be available for as long a tour of duty as possible.

Key decisions on a large-scale ISD project can be expedited by soliciting inputs from the key people affected by the decision. This was done with increasing regularity as the project moved toward implementation of the instruction. Delays occurred early because of the absence of this kind of feedback. In most cases, however, limited response times were available. This had the effect of restricting the number and quality of these inputs.

If progress checkpoints are carefully monitored, deviations in scheduled progress can be corrected immediately by stepping up the pace, cutting back on scope, or adding additional labor. Joint Navy/contractor cooperation is essential in identifying and solving problems of this nature.

For projects involving multiple sites, decisions on site responsibilities and on transmittal of information, especially classified information, between sites can become critical. Firm agreements before work is begun, or as soon as possible after multiple sites have been identified, will alleviate problems in this area.

When new course content is to be introduced into a developing training system, it is important to identify the time frame of introduction, the SMEs who will provide the information, and anyone who actually has experience with the new content, and to set up access to the needed personnel. If this is not done, the instruction that is developed may become obsolete soon after it is implemented.

RECOMMENDATIONS

1. In future ISD efforts, CNO and NAVAIRSYSCOM should consider separating the instructional design tasks (job analysis, competency analysis, media selection, and syllabus development) from the development tasks (authoring, production, and subsequent phases)

and creating a two-phased approach to conducting instructional development of this scope. In this way, the extent of the development effort can be determined by using the results of the design effort, and resource availability requirements can be more accurately determined.

2. On an instructional development effort of this scope, it is not feasible for Navy organizations to supply all of the required subject matter expertise without crippling other operational requirements. Contractor-supplied SMEs who work with a small cadre of Navy SMEs should be considered.

3. On a project of this complexity, participants should dedicate personnel to the project for the entire development cycle or for as long as possible. These personnel should be selected for their ability to contribute subject matter or other expertise, and the time they spend on the project should provide a positive rather than a negative influence on career growth.

4. It is essential that the appropriate Navy organizations maintain a sense of responsibility for the success of the program since they will eventually lose contractor and other outside support. They must also share responsibility for accuracy of content and timeliness of project activities during the course of the project.

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APPENDIX A

JOB ANALYSIS SURVEY MATERIALS

JOB ANALYSIS SURVEY

PERSONAL INFORMATION

Name ______________________ Rank ____________ Date ____________

Years in Service ____________ Squadron ____________ Position __________ A/C ________

INSTRUCTIONS

The Instructional Systems Development Team (ISDT) from VP-30/31 is located at Moffett Field, California. In conjunction with Courseware, Inc., we are developing training for P-3 crewmembers. We conducted a Job Analysis of your position in the P-3. This Job Analysis describes the major tasks that are required to perform your position. We want to be sure that relevant tasks were not left out and that we have not included tasks that are not really required. In addition, we want to ask you several things about each task, such as the difficulty of the task.

You should read all of the tasks in the Job Analysis. However, you only have to respond to those items for which there is a corresponding number in the Survey. This is because some of the tasks in the Job Analysis are really introductory titles. They will tell you what phase of a mission we are discussing, but there is no need to respond. On the other hand, it is important that you answer all of the items that are indicated on the Survey as accurately as possible because your responses will influence how new people in your position will be trained throughout the Navy.

The next page gives a description of each item on the Survey.

SURVEY ITEMS DEFINED

COLUMN 1 - OUTLINE NUMBER

These numbers correspond to the tasks on the Job Analysis. They are in the same physical location on the Survey page as on the Job Analysis page.

COLUMN 2 - TASK AGREEMENT

Do you agree that the task is required in your position? Check yes or no.

COLUMN 3 - CRITICALITY

Is the task critical or important to the accomplishment of your job? Check.

H (High) - Absolutely essential to job
M (Medium) - Important to job
L (Low) - A handy short-cut

COLUMN 4 - FREQUENCY

How often or frequently do you do the task? Check:

H - Performed more often than other tasks
M - Performed less often than other tasks
L - Performed very seldom

COLUMN 5 - DIFFICULTY

How hard or difficult is the task? Check H, M, and L difficulty.

COLUMN 6 - LEARNED BEFORE VP-30/31

Did you learn the task before you arrived at VP-30/31? Check yes or no.

COLUMN 7 - USED IN FIRST YEAR AFTER VP-30/31

Did you perform the task during your first year after training at VP-30/31? Check yes or no.

REMARKS -

Remarks can be put on the back of each page. If you think a task should be added or deleted, say so. Also, feel free to qualify any of your responses on the back of the page.

1 MISSION PREPARATION

1.1 Set priority for performance of mission preparation functions.

1.2 Perform mission preparation functions by selected priority.

1.3 Give the tactical brief to the crew.

1.3.1 Obtain information required for brief.

1.3.1.1 Obtain mission profile from Green, Op Order, or other applicable publication.

1.3.1.1.1 Obtain mission goal.

1.3.1.1.2 Obtain milestones for mission.

1.3.1.1.3 Obtain operating area, route, and altitudes.

1.3.1.1.4 Obtain EMCON requirements.

1.3.1.1.5 Obtain mission abort criteria.

1.3.1.1.6 Obtain armament and ordnance loads.

1.3.1.2 Obtain aircraft information.

1.3.1.2.1 Obtain location.

1.3.1.2.2 Obtain aircraft status from aircraft discrepancy log (OPNAV 4790/1 Organizational Register Cards).

1.3.1.3 Obtain communications plan.

1.3.1.3.1 Obtain enroute communications plan.

1.3.1.3.2 Obtain tactical communications plan.

1.3.1.4 Obtain intelligence information.

1.4.1.4.1 Obtain target intelligence.

1.3.1.4.1.1 Obtain target acoustic intelligence.

1.3.1.4.1.2 Obtain target non-acoustic intelligence.

1.3.1.4.1.3 Obtain target track history.

1.3.1.4.2 Obtain intelligence on other mission-related targets.

1.3.1.4.2.1 Obtain acoustic intelligence on other mission-related targets.

1.3.1.4.2.2 Obtain non-acoustic intelligence on other mission-related targets.

1.3.1.4.3 Obtain intelligence on physical environment.

JOB ANALYSIS SURVEY RESPONSE SHEET

1 Outline Number	2 Task Agreement		3 Criticality			4 Frequency			5 Difficulty			6 Learned Before VP 30/31		7 Used In First Year After VP 30/31		8 Task Selection
	YES	NO	H	M	L	H	M	L	H	M	L	YES	NO	YES	NO	
1.1	18		13	5		12	6		2	14	4	3	15	6	5	
1.2	17	1	10	7	1	12	5	1		14	4	3	16	6	5	
1.3.1.1	18		16	2		8	5	5	2	11	4	1	17	7	4	
1.3.1.1.1	18		14	4		10	4	4	1	11	6	4	14	5	5	
1.3.1.1.2	16	1	3	8	3	6	2	8	1	9	6	2	13	6	5	
1.3.1.1.3	18		16	2		12	2	4		9	9	2	16	8	3	
1.3.1.1.4	17		12	5		10	3	4		5	12	1	16	7	4	
1.3.1.1.5	18		14	4		10	3	5	3	4	11	2	15	6	4	
1.3.1.1.6	18		13	5		12	2	4	1	6	7	2	16	7	4	
1.3.1.2	14		13	5		13	4	1		5	13	8	10	9	2	
1.3.1.2.1	9	6	9	4	3	12	1	5		1	17	7	10	9	2	
1.3.1.2.2	18		11	7		16	2			2	16	10	8	8	2	
1.3.1.3	18		14	4		10	5	3		9	9	2	16	9	2	
1.3.1.3.1	16	1	13	3	2	11	2	5		9	9	2	16	9	2	
1.3.1.3.2	18		16	2		11	4	3		10	8	1	17	[illegible]	[illegible]	
1.3.1.4.1	18		16	2		8	6	4	6	10	2	2	16	[illegible]	2	
1.3.1.4.1.1	18		16	2		8	5	5	4	3	11	2	16	9	2	
1.3.1.4.1.2	18		14	2	2	8	5	5	5	11	2	2	16	8	4	
1.3.1.4.1.3	17	1	8	7	3	8	6	1	4	8	6	2	16	8	3	

APPENDIX B

MEDIA ALTERNATIVES

MEDIA ALTERNATIVES

Purpose of Media Alternatives

Media were not selected for esthetic purposes alone but, rather, to enhance learning from an educational psychology perspective. This means that learning principles had to be considered in a systematic way during media selection. Instruction was thus viewed in terms of factors such as the types of learning desired, the level of content being dealt with, the number of examples needed to ensure learning, and the type of display required. Each objective was examined in terms of these factors and an appropriate media choice was determined as a result. The selection of media, based upon learning considerations discussed above, was rather complex. To aid in this task, an algorithm was developed based on the one used in developing the FRS training syllabus for S-3A crew members.

Preparation of the Input

The five questions listed below were answered for each objective. The answers served as input to the algorithm:

1. What is the level of behavior expected of the student from this objective? This question refers to how the student will be tested; that is, the type of behavior expected of the student during testing. The three alternative responses for this question are:

   a. Familiarization. This means that there will be no test question, because the student only has to have a cursory knowledge of the objective.

   b. Memory. This refers to any item that the student must recall or recognize. Most true/false, multiple-choice, *fill-in-the-blank, list learning, etc.* test items would fall into this response category.

   c. Rule-using. This is inferred when the student must identify instances of a given rule and apply the rule or procedure. Classification and computation are instances of rule-using behavior. Here, the student must recognize that the rule applies (classification) and then perform the required procedures (computation) for a new problem or instance that was not previously seen.

2. What level of content is being taught in this segment? This question refers to the purpose of the instruction; that is, what the course developer intends to teach. The four alternatives to this question are:

   a. Familiarization. The intent of the instruction is to give an overview of the content rather than to teach specific information to be remembered. This information is nice to have but not required.

   b. Memory. The intent of the instruction is for the student to learn items that go together and that are to be learned verbatim. For example, given item A, item B will always follow (e.g., when the green light goes on, the operator pushes the start button).

   c. Classification. The intent of the instruction is to teach the critical attributes of a given class of objectives having a common name. For example, the concept "tree" would include knowing the critical attributes of a tree so that new instances of trees could be identified. Another example is picking out the items in a list that fall into a given category.

d. Rule. The intent of the instruction is to teach a calculation or operation and the circumstances under which it is to be performed. For example, there are innumerable instances of areas of a circle (i.e., as many instances as there are different-sized circles). The rule for finding area is $A = \pi r^2$. The instruction would show that this calculation can be used for all instances of circles. Another example is applying a set of procedures to perform a task.

3. If the answer to Question 2 is classification or rule, is the minimum critical set of instances that the student needs to see small or large? The two alternatives to this question are:

a. Small. Here the student needs to see three or less than three instances or examples to recognize critical attributes of the concept or rule.

b. Large. Here the student needs to see more than three instances or examples to recognize critical attributes of the concept or rule.

4. What is the minimum display requirement? This question refers to the type of presentation that is thought to be required for the initial training in performing the tasks. The four alternatives to this question are:

a. Static simple. This instruction requires a simple nonmoving picture accompanied by some verbal explanation. A simple cartoon, line drawing, or listing of items are examples of this alternative.

b. Static complex. This instruction requires a complex nonmoving picture accompanied by some verbal explanation. A picture of a complex piece of equipment or a complex diagram is an example of this alternative.

c. Dynamic. This instruction requires a moving picture or an audio. A videotape of a pilot adjusting the yoke is an example of this alternative. Another example is learning to recognize and identify various audio codes.

d. Hands-on. This instruction requires using actual equipment, including simulators or mockups, for the initial training.

5. Is the memorization component of this objective small or large? The two alternatives to this question are:

a. Small. The student only has to remember five or less items.

b. Large. The student has to learn more than five items.

Figure B-1 is an example of the form used for entering the media selection input. The first column, labeled task number, corresponds to the task or objective number in the competency analysis. Similarly, the second column, labeled action, corresponds to the action portion of the instructional objectives found in the competency analysis. The columns labeled Q1-Q5 contain the answers to the five questions (discussed above) that form the input to the media selection algorithm.

POSITION Pilot P-3A/B & C P-3 MEDIA SELECTION MISSION Pretakeoff PAGE 43

TASK NUMBER	ACTION	MEDIA ALGORITHM						MEDIA CHOICE				INSTRUCTIONAL ASSIGNMENT				
		Q1	Q2	Q3	Q4	Q5	TIME	1	2	3	4	C	U	L	S	X
2.1.3.3.4.3.2.2	Determine climbout flight path.	3	4	2	2	2	44*	C	SW	L	WB					
2.1.3.3.4.3.2.2.1	Compute climb performance factor from Climbout Flight Path and Climb Performance Chart.	3	4	2	2	2	44*	C	SW	L	WB					
2.1.3.3.4.3.2.2.-1.1	Compute Three Engine Climb Performance Factor.	3	4	2	2	1	42	C	SW	L	WB					
2.1.3.3.4.3.2.2.-1.1.1	Select proper chart.	2	2	0	1	1	15	WB	S,WS	L						
2.1.3.3.4.3.2.2.-1.1.1.1	State location of chart.	2	2	0	1	1	15	WB	S,WS	L						
2.1.3.3.4.3.2.2.-1.1.1.2	State type aircraft.	2	2	0	1	1	15	WB	S,WS	L						
2.1.3.3.4.3.2.2.-1.1.3	State operation.	2	2	0	2	2	8	S,WS	L							
2.1.3.3.4.3.2.2.-1.1.4	State configuration.	2	2	0	2	1	8	S,WS	L							
2.1.3.3.4.3.2.2.-1.1.2	State procedure for operating chart.	2	2	0	1	1	15	WB	S,WS	L						
2.1.3.3.4.3.2.2.-1.1.2.1	Interpret chart instructions.	2	2	0	1	1	15	WB	S,WS	L						
2.1.3.3.4.3.2.2.-1.1.3	Obtain values for entry information.	3	4	1	1	1	37	WB	C	L	SW					

Figure B-1. Example of completed media selection form.

Media Algorithm

Figure B-2 presents the algorithm used in the selection of media alternatives. The answers to the five questions (discussed above) served as inputs to the algorithm. The algorithm begins in the center at the point designated by the triangle. Depending on the answer provided to Question 1, the user is then directed by an arrow to the next appropriate question. For example, if the answer to Question 1 is Alternative 2 (memory), the algorithm goes to Question 2. If the answer to Question 2 is Alternative 2 (memory), the algorithm goes to Question 4. If the answer to Question 4 is Alternative 3 (dynamic display), the process ends and the media selected is M9. The specific media for each media number are listed in Table B-1. As shown, the options for M9 are videotape and worksheet for the first choice and mediated interactive lecture for the second choice.

This procedure was applied to every task selected for training.

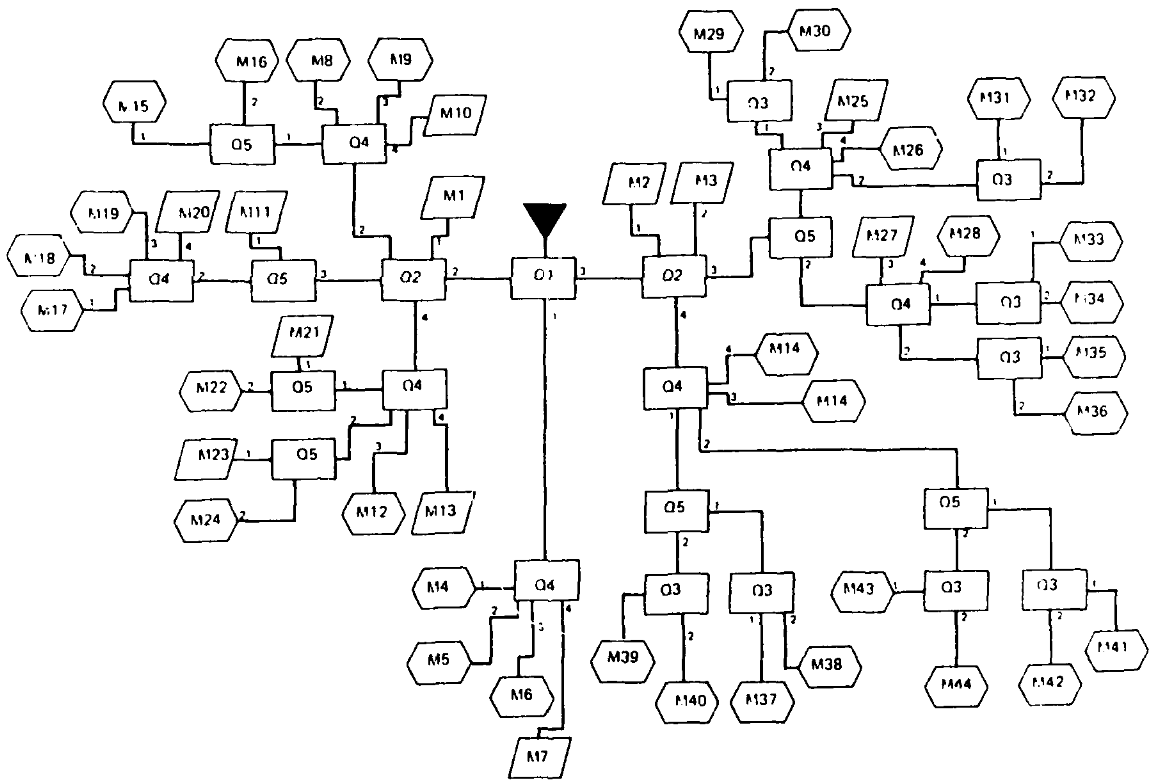


Figure B-2. Media selection algoritm.

Table B-1

Key to Media in the Media Selection Algorithm

Media Number	Description
M1	You are trying to teach familiarization level content but are testing at a memory level. You shouldn't do that.
M2	You are trying to teach familiarization level content at a rule-using level. You can't do that.
M3	You are trying to teach memory level content at a rule-using level. You can't do that.
M4	First choice: Workbook. Second choice: Mediated interactive lecture.
M5	First choice: Workbook. Second choice: Slide-tape presentation.
M6	First choice: Videotape. Warning: It may not be worth the expense.
M7	It is probably a waste of time and resources to teach this objective at a familiarization level.
M8	First choice: Slide and worksheet. Second choice: Mediated interactive lecture.
M9	First choice: Videotape and worksheet. Second choice: Mediated interactive lecture.
M10	Why do you need an interactive presentation to teach memory level behavior?
M11	Combine this objective with the classification level objective dealing with this content.
M12	First choice: Videotape and worksheet. Second choice: Mediated interactive lecture.
M13	Why do you need an interactive simulation to teach a memory level behavior?
M14	First choice: A simulator or the actual equipment and a worksheet. Second choice: A CAI simulation.
M15	First choice: Workbook. Second choice: Slide and worksheet. Third choice: Mediated interactive lecture.
M16	First choice: CAI memory game. Second choice: Workbook. Third choice: Slide and worksheet.
M17	First choice: CAI memory game. Second choice: Workbook. Third choice: Slide and worksheet.
M18	First choice: CAI memory game. Second choice: Slide and worksheet. Third choice: Workbook.
M19	First choice: Videotape and worksheet. Second choice: Mediated interactive lecture.
M20	Why do you need an interactive presentation to teach a memory level behavior?
M21	Combine this objective with the workbook portion of the rule-using level objective dealing with this content.

Table B-1 (Continued)

Media Number	Description
M22	First choice: CAI memory game. Second choice: Workbook. Third choice: Slide and worksheet.
M23	Combine this with the workbook portion of the rule-using level objective dealing with this content.
M24	First choice: Videotape and worksheet. Second choice: Mediated interactive lecture.
M25	First choice: Videotape and worksheet. Second choice: Mediated interactive lecture (with VT).
M26	Why do you need an interactive presentation with the classification level content?
M27	First choice: Videotape and worksheet. Second choice: Mediated interactive lecture (with VT). Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.
M28	Why do you need an interactive presentation with classification level content?
M29	First choice: Workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Random access slide-workbook.
M30	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Workbook. Fourth choice: Mediated interactive lecture.
M31	First choice: Random access slide-workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Workbook.
M32	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Mediated interactive lecture. Fourth choice: Workbook.
M33	First choice: Workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Random access slide-workbook. Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.
M34	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Workbook. Fourth choice: Mediated interactive lecture. Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.
M35	First choice: Random access slide-workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Workbook. Note. Be sure you have a separate objective to teach the large memory component of this objective at the discrimated recall level.

Table B-1 (Continued)

Media Number	Description
M36	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Mediated interactive lecture. Fourth choice: Workbook. Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.
M37	First choice: Workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Random access slide-workbook.
M38	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Workbook. Fourth choice: Mediated interactive lecture.
M39	First choice: Workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Random access slide-workbook. Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.
M40	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Workbook. Fourth choice: Mediated interactive lecture. Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.
M41	First choice: Random access slide-workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Workbook.
M42	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Mediated interactive lecture. Fourth choice: Workbook.
M43	First choice: Random access slide-workbook. Second choice: CAI. Third choice: Mediated interactive lecture. Fourth choice: Workbook. Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.
M44	First choice: CAI. Second choice: Random access slide-workbook. Third choice: Mediated interactive lecture. Fourth choice: Workbook. Note. Be sure you have a separate objective to teach the large memory component of this objective at the memory level.

Media Choices

The media choice was selected from the alternatives listed in Table B-1. Whenever possible, the first choice was selected. However, when the first choices were different for segments in a given lesson, attention was given to the practicality of using all first choices. That is, it would be inefficient for a student to get 5 minutes of workbook in one room, 5 minutes of CAI in another room, and 5 minutes of lecture in still another room. Compromises were made in this case. The procedure used to select media was:

1. Examine the media alternatives in Table B-1.

2. Make a tentative media selection for each segment.

3. Examine the choices across segments and lessons to determine their practicality.

4. Make a final choice for each segment.

The media selection codes are given in Table B-2.

Table B-2

Media Selection Code

A =	Aircraft or simulator
V =	Videotape
L =	Lecture
S =	Slide-tape
WB =	Workbook
WS =	Worksheet
C =	CAI
SW =	Slide-workbook
X =	NO GO

APPENDIX C

SEQUENCING INSTRUCTIONAL OBJECTIVES

SEQUENCING INSTRUCTIONAL OBJECTIVES

The purpose of sequencing instructional objectives is to develop an instructionally sound sequence for presenting training to the student. The training materials/methods may be viewed in three major categories:

1. Individual study lessons. These include all self-instructional and lecture type training. The media used for this training may be self-instructional texts, videotapes, slides, computer-assisted instruction, or mediated interactive lectures.

2. Device sessions for training individual crew positions. Here, the device is dedicated to a single position so that crew integration is not required. The devices used are position trainers (PTs), operational flight trainers (OFTs), cockpit familiarization trainers (CFTs), and cockpit position trainers (CPTs). In most cases, weapon systems trainers (WSTs), intended for integrated crew training, will be used later in the training along with flights (Fs). In some cases (e.g., NFO, pilot, FE), the 2F69 or 2F87 WSTs are also used for one position operating independently. In these cases, the equipment is called a PT. When an aircraft is used for training on the deck without the full crew, it is called an aircraft lab (AL).

3. Device sessions for training an integrated crew. Integrated crew training on WSTs and Fs will contain relatively complete evolutions of problems for the crew to solve.

Seqencing Strategy

Objectives sequenced for study lessons must prepare the student for device sessions. Therefore, device-related tasks are planned first and study lessons are sequenced as required; that is, the device session determines what is taught in the study lesson. This procedure avoids having device sessions that are too long for effective learning. If study lessons were sequenced first, the sequence chosen might not lend itself to an efficient device session. Further, much was learned from current practices in using devices. For example, the scope and limitations of VP-30/31 devices were determined. The performance portion of the task diagram was compared to current VP-30/31 training objectives. The aim was to be sure that tasks currently receiving hands-on experience were not omitted from the new syllabus. Conversely, any performance tasks in the task diagram that were not currently performed with devices were considered for deletion from the task diagram. This procedure permitted observation of current device usage that might be useful in the new syllabus.

Sequencing Device Sessions

The following steps were taken as a means of initially sequencing device sessions:

1. Listing Major Equipment Tasks from Current Training. All tasks that are currently performed on the PTs, CFTs, OFTs, CPTs, WSTs, ALs, and Fs were listed. The tasks that are presently being performed were obtained from existing documentation (e.g., syllabus, grade sheets, objectives, and other course material). A separate list of tasks related to a given position was prepared for each device category mentioned above.

2. Matching Device-related Tasks to the Task Diagram. Each device-related task listed in the previous step was then matched to a task in the task diagram. In most cases, this was an upper-level task. This procedure provided a double check between current performance requirements and the new syllabus objectives.

a. The first question asked was, "Are there any items in the list of current equipment-related tasks for which there is no task in the task diagram?" If there were such tasks, they were discussed with the instructional psychologist (IP). A decision was then made either to add the tasks to the task diagram or to omit them. In either event, the rationale for the decision was made clear.

b. The second question was, "Are there any performance items in the task diagram that are not currently performed on the equipment?" Occasionally, lower-level performance items on the task diagram were not directly represented on the list of equipment-related tasks (see Figure C-1, Example A). This procedure was acceptable if the upper-level task was performed on a trainer and included in the lower-level tasks. If all lower-level tasks were represented in present trainers, it was assumed the upper-level task was included (see Figure C-1, Example B). If a true mismatch occurred, as in Figure C-1, Example C, it was discussed with the IP. Again a decision was made to either add a task to one of the device-related sessions or omit it. In either event, the rationale was made clear.

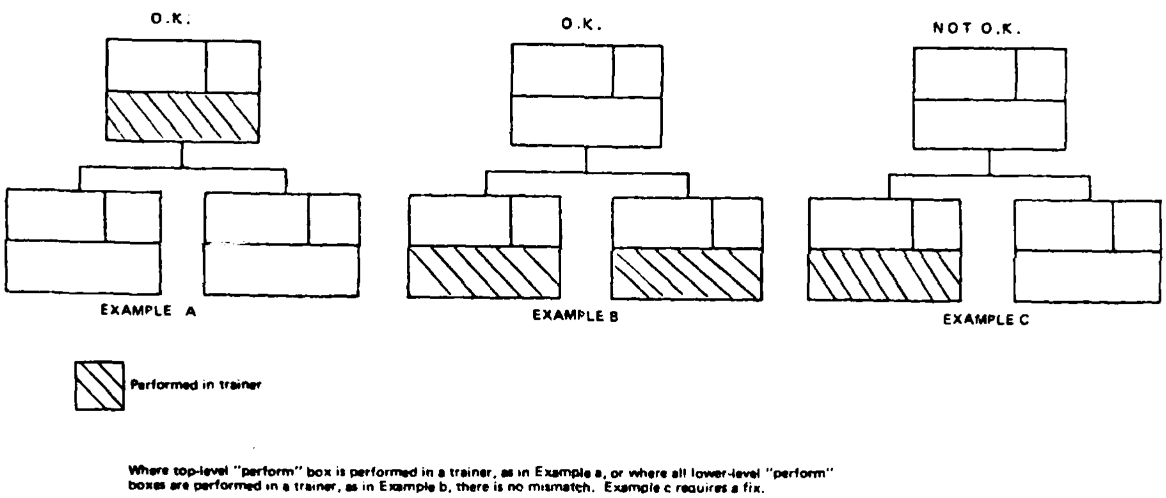


Figure C-1. Identifying performance items not currently taught on the equipment.

c. The SME and IP team then added or rearranged tasks for each device. The basic strategy was to assign a task to the least sophisticated device for the first performance. Thus, a task that was currently performed first on a WST was reassigned to a PT for initial performance. The task would still be performed on the WST but as a repetition rather than as an initial performance. This procedure produced a complete and revised list of tasks to be performed on every device.

3. <u>Grouping Performance Objectives (Device-related Tasks) into Sessions.</u>

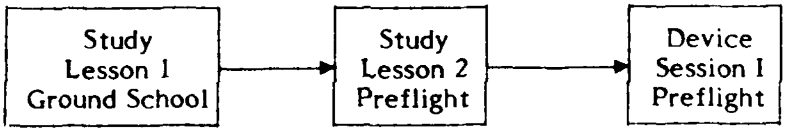
a. The device-related objectives, or performance tasks, were grouped into sessions (one sitting at the device). The tasks that were grouped together were closely related and capable of being performed within 1 to 3 hours.

b. If the performance of one task was dependent on another task within the session, the tasks were ordered according to required prerequisites. If one task was more difficult than another, the more difficult task was ordered first (remembering prerequisites). This procedure gave more time for remedial practice of difficult tasks. As a result of these steps, all of the performance tasks were grouped into sessions and initially sequenced.

Sequencing Study Lessons

1. Relationship Between Study Lessons and Device Sessions. Study lessons contain all of the non-device-study objectives that precede a device session. In most cases, a device session was preceded by one related study lesson. Sometimes, however, a device session was preceded by more than one study lesson. This procedure occurred when one of the study lessons was unrelated to the device session (e.g., when Study Lesson 1 is "Ground School" and Study Lesson 2 is "Station Preflights," which is directly related to Device Session 1). An example of a typical case is:

An example of an exception is:



2. Information Included in Study Lesson Objectives. Objectives for study lessons contain the information necessary to carry out the "perform" objectives in the device session or the information for an unrelated study lesson (such as in the previous example). Each device session was usually preceded by at least one study lesson that taught any or all of the following types of information included in the "state" and "list" type of objectives (not performance objectives):

a. Location of systems, components, and switches necessary to perform particular procedures or operations in the device (e.g., "Locate MAD and Doppler power switches").

b. Statement of procedures to be performed (e.g., "State procedures for performing sector scan").

c. Statement of satisfactory indications of performance procedures (e.g., "State indications for proper preflight of ASQ-10").

d. Statement of corrections for misperformed procedures or for malfunctions (e.g., "State corrections for bad crystals").

e. Explanation of circumstances in which procedures should be used (e.g., "State when to use range scaling").

f. Statements of information necessary for performing procedures (e.g., "State information necessary for performing BRUSHTAC tactics").

g. Statements of characteristics of concept to be identified (e.g., "State corrective action for an inflight APU hot start").

Relationship Between Units, Lessons, and Segments

1. Course Organization. The instruction designed for each track formed a course. The course was divided into logical pieces called units. Units were determined on the basis of equipment operation, mission type, or by some other logical topical grouping for the track. Units were then made up of lessons, and lessons were made up of segments. Figure C-2 is an example of topics that were considered as (a) a unit, (b) lessons, and (c) segments.

a. Unit: Radar operation

b. Lessons:

Radar preflights
Contact recognition
IFF operation
Safety of flight
Radar navigation
Radar in-flight checks
Tactics

c. Segments:

(Lesson: Radar preflights)
Control recognition
Radar manual checks
Turn-on and adjustments

Figure C-2. Sample unit, lesson, and segment topics.

2. Segments. Segments are the basic instructional units that fit together to form lessons. They are objectives that serve as a reasonable basis for several pages of instruction. Sometimes a segment encompasses several objectives not suitable for separate pieces of instruction (e.g., for "locate," or "state characteristics of a small portion of a piece of gear"). Only segments are shown on lesson maps. All objectives included within a segment are shown in the list of objectives that accompanies the map. The objectives were listed on the P-3 instructional sequence form (Figure C-3). The unit and lesson numbers appear in the upper right corner of the page; and the segment number, in the segment number column.

P 3 INSTRUCTIONAL SEQUENCE

POSITION ____

Unit ____

Lesson ____

SEG. NO.	TASK NUMBER	ACTION	CONDITION	STANDARD	TD PAGE	TIME & REPETITIONS
6	- - - -	List procedures for Gear X preflight	- - - -	- - - -	-	[illegible]
1	- - - -	Describe tools which are necessary for adjustment of MAD equipment.	- - - -	- - - -	-	[illegible](2)
	- - - -	State where Gear X tools are located.	- - - -	- - - -	-	[illegible]
	- - - -	State type of tools required for Gear X adjustments.	- - - -	- - - -	-	[illegible]
	- - - -	State which adjustment each tool is used for.	- - - -	- - - -	-	4
2	- - - -	Fill in preflight forms.	- - - -	- - - -	-	[illegible](2)
5	- - - -	Describe preflight of Component A.	- - - -	- - - -	-	30([illegible])
3(5)	- - - -	Describe function of Component A.	- - - -	- - - -	-	30(3)
4(5)	- - - -	Describe location of Component A.	- - - -	- - - -	-	1/2
	- - - -	Describe operations of Component A.	- - - -	- - - -	-	10

Figure C-3. Sample P-3 instructional sequence form.

3. Lessons. Segments that are closely related to each other (for example, those concerning the preliminary identification of radar contacts) were grouped together to form a lesson. The lesson leads to a logical testing point for the related objectives and was constructed with a related set of segments that were given a common name. Consequently, for a unit on the operation of radar, a lesson was designed for the preliminary identification of contacts. This lesson was one of many (e.g., preflights, chart/scope coordination, contact pursuit, etc.) that fall within the unit on radar. Lessons varied in length, depending on the media for instruction, but were seldom more than a few hours long.

4. Units. Units were made up of related lessons that fit together to form a logical whole. As mentioned earlier, each unit usually contained several lessons. A unit on radar contains lessons on radar equipment, preflight, contact identification, radar tactics, radar navigation, the use of ICS, etc. All of these topics were covered prior to one or more device sessions.

In many cases, a unit spanned several device sessions. For example, the Sensor 3 track contains units relating to the functions performed on equipment systems, such as radar, MAD, and ESM, which require multiple device sessions for adequate training. Multiple sessions are used to provide sufficient practice with increasingly difficult and complex examples, as well as to provide practice on unduly varied skills that fall within the same unit (e.g., radar preflights and radar contact identification). In these cases, the units contain several lessons with interspersed device sessions.

Time Estimates

Time estimates were made for each lesson and for certain objectives in the sequencing document (see Figure C-3, right-hand column). The following rules were followed:

1. Time estimates include the total time to present information about a given objective and to have the student learn that information well enough to pass a lesson test. Therefore, presentation time, repetition time, and learning time were included. If it takes an estimated 10 minutes to present a list of items to be learned, but it is estimated that the student would need to see the list three times (repetitions) to learn it, then the total time would be 30 minutes (3 x 10 = 30). The number of repetitions refers to the number of times the instructional material is presented to the student, including the initial presentation. The time to study the material during the study lesson was also included in the estimate.

2. The time estimate was entered in the last column on the right of the sequencing form (Figure C-3). The total time to learn each segment is shown along with the number of repetitions (presentations), which are enclosed within parentheses (e.g., 30 (3)).

a. Some segments are only titles and contain no new instruction. Therefore, no time estimate was entered for these objectives.

b. Some segments are titles but also contain some new instruction. Only the time estimate for the new instruction was entered for these segments.

c. The total time for the lesson was entered next to the lesson objective and set off between double lines. The total time was derived by adding all of the segment time estimates for the lesson.

3. Equipment sessions take from 1 to 3 hours. The WSTs at the end of the course (integrated crew) are about 3 hours. However, the position trainer sessions that come between study sessions will often be on the shorter side (about 1 to 2 hours). It was considered preferable to have several short equipment sessions rather than one large one, provided that setup time was not excessive. This procedure puts hands-on in close proximity to the study lesson and eliminates combining of incompatible objectives.

Designing Lesson Maps

1. Purpose of Lesson Maps. Lesson maps were designed to show the students (a) where they are in the instruction, (b) where they came from, and (c) where they are going. The maps can be viewed as an index that helps the students keep their place as they progress through the lesson. The sequence in which the student encounters the instructional material is determined by the lesson maps rather than by the physical location of objectives in the sequencing document; that is, the objectives may be in a variety of physical orders on the P-3 instructional sequence form (Figure C-3) (e.g., 1, 2, 3, 4, etc., or 4, 1, 2, 3, etc.), but the order of presentation to the student is determined by the segment number assigned to the objectives and corresponding lesson maps (see Figures C-3 and C-4). The reason for objectives appearing in a variety of physical orders is to permit whole sections of objectives to be lifted from the hierarchical analysis document and cut and pasted into the sequencing document.

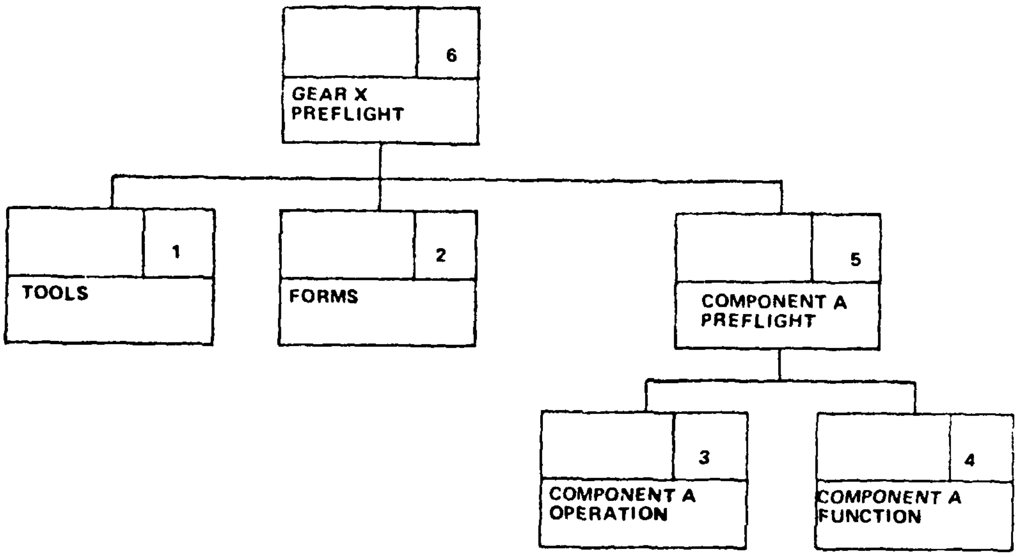


Figure C-4. Sample P-3 instructional map.

2. Size of Lesson Maps. How large is an effective lesson map? A lesson map with one or two boxes, for example, will not help students very much because they can keep

track of one or two segments of instruction without additional aids. Conversely, a lesson map with 20 boxes, for example, may not help the students, because it will be too complex for the students to be willing to give it any attention. Moreover, 20 segments usually are too long for a single lesson. While there is no fixed size to an efficient map, a range of about three to ten boxes was considered to be acceptable. If a lesson exceeded 15 to 20 segments, it was considered for possible division into two lessons. In addition, the lesson was examined to determine if some segments were actually lower level objectives. If an objective took 5 minutes or less to teach and learn, it was considered too small to be a segment. It still appeared in the sequencing document but it had no map box or segment number.

3. Lesson Map Format. Each lesson map consists of several boxes containing all of the highly related segments for a given lesson (see Figure C-4, boxes 1 through 5). In addition, each map contains a single upper level box that is a common testing point for that lesson (see Figure C-4, box 6). There is no instruction for this box, only a test. The numbers within the boxes correspond to the segment numbers on the sequencing page.

The following information pertains to lesson maps where each map box represents a segment within a lesson. Each map box contains three pieces of information: (a) a segment number in the upper right corner of the box, (b) a brief segment title in the lower half of the box, and (c) the media choice for that segment in the upper left corner of the box.

a. Segment Numbers. The segment numbers directly correspond to the segment numbers in the left column of the P-3 instructional sequence form (Figure C-3). The determination of segment numbers can be accomplished best if an instructional map is drawn simultaneously with assigning sequence numbers to the objectives on the P-3 instructional sequence form.

Because the lesson maps are to be used as indexes by the student, the boxes are shown with their corresponding segment numbers in the order that the student will receive the instruction (Figure C-4). Therefore, the boxes are presented in pyramid form such that the first segment is on the lower left side of the map and subsequent segments appear from left to right. Segment boxes appearing at the same horizontal level within a leg of the pyramid are relatively independent of each other. The sequential order shown is the recommended order that the student should use. However, when segments logically relate to each other, they were grouped together by placing the related boxes vertically at a lower level, as shown by boxes 3 through 5 in Figure C-4. Thus, segment 1 does not logically group with segment 2 or with segments 3 through 5, but segments 3 through 5 do logically group together. The idea was to show the student a logical grouping of segments. Segments closely related are shown vertically. Segment 5 might not have any unique instruction. Rather, it might be a title for the combination of segments 3 through 4. Conversely, there might be occasions when segment 5 is a title for the lower level boxes and also contains some new instruction.

The top box of a lesson map (box number 6 in Figure C-4) is actually the lesson title, which requires no new instruction. Rather, the top box is a test point for all the segments in the lesson. Therefore, a lesson test, rather than more instructional material, is constructed for the top box. The lesson might also culminate in a device session performance test.

b. Segment Titles. A brief, but descriptive, segment title was written for each segment box. The title was based upon the action portion of the objectives. For example, the objective "state the characteristics of land-masses" might be given the brief title "landmasses."

WST and Tactical Flight Sessions

Since many crew members operate together in the WST and tactical (TAC) flights, the WST and TAC flight sessions were designed by all SMEs and IPs as a team effort. The focus of each session is a problem that was explicitly stated and agreed to.

Each WST session was described in a four-page form (Figure C-5). The first page is a basic description of the applied problem and the mission goals. The second page provides space for each SME to detail the skills to be practiced for his position. The next page is a problem difficulty factors form that describes the WST session in sufficient detail for programming the computer to run the problem. It contains (1) the number, type, and presentation of each target, (2) the ocean difficulty, (3) intelligence information provided to the crew, and (4) planned gear malfunctions that the crew must cope with.

Ocean difficulty was based on an approximate ranking of 11 propagation loss profiles. A scenario of target and crew maneuvers is supplied on the next page of the form. Events on the time line are overridden by an attack or use of active tactics. That is, if an event is planned for minute 160 and the sub is successfully attacked in the first hour, then the event at 160 minutes will not occur. In addition, if the sub is to perform a specific maneuver, but the crew goes active first, the evasion routine will override the planned maneuver. Moreover, the appearance of a new target may depend on crew performance in the early portion of the session. For example, if the crew is efficiently tracking the initial target, a new and more difficult target could be introduced. TAC flights were designed using only the scenario description.

The skills list was used to produce a checklist of tasks to be performed at each device session and flight. Since the problem and tactical situation dictate the order in which tasks are encountered, device sessions and flights do not appear in lesson maps.

DESCRIPTION OF THE PROBLEM

Aircraft ____________________ WST ______________________

Figure C-5. WST session description forms.

SKILLS TO BE PRACTICED

Aircraft ________________

Position	Skills
Pilot	
NAV(NAV/COM)	

WST ________________

Position	Skills
TACCO	
SS-1/2	
SS-3	

Figure C-5 (Continued)

PROBLEM DIFFICULTY FACTORS

Aircraft ______ *WST* ______

Target

Number of initial contacts *of interest* ____ (1,2, or 3)

New contact appears if crew *is performing well* ____ (Check if desired)

Type of sub
- Soviet
  - Diesel
    - Type II ____
    - Type III ____ (Check one)
  - Nuclear
    - Type I ____
    - Type II ____
    - Type III ____
- U.S. Nuclear ____

Description of other targets ____

Evasive tactics become complex if crew is performing well ____ *(Check if desired)*

Target control (speed heading depth)
- Preprogrammed ____ (Check one)
- Instructor modifiable ____

Distractors
- Number ____ (1,2, or 3)
- Type ____
- Position ____

Ocean Difficulty

Level of difficulty (Increasing) — Name of ocean

1 ____
2 ____
3 ____
4 ____
5 ____
6 ____
7 ____ (Check one)
8 ____
9 ____
10 ____
11 ____

Intelligence

Size of initial AOP ____ *(Radius)*

Operational constraints
- Buoy types not available ____
- Total number of buoys ____
- Active restrictions ____

Gear Malfunctions

Buoy (number failed) ____

Aircraft equipment (name of gear) ____

Figure C-5 (Continued)

SEQUENCE OF EVENTS

Aircraft ________________ WST ____________________

Time	Event
Zero	
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
130	
140	
150	
160	
170	
180	

Note: Sub evasion begins automatically when the crew goes active or drops a weapon. Complexity of the evasion may be set.

Figure C-5 (Continued)

APPENDIX D

LESSON SPECIFICATION DOCUMENTS

LESSON SPECIFICATION DOCUMENTS

General

Lesson specification documents (LSDs) are written for three levels of objectives: memory, concept, and rule-using. Examples of lesson and segment specifications for these three types of objectives are provided at the end of this appendix.

The LSD may consist of up to seven sections, which are described below.

1. Classified LSD title page. This page is included only when dealing with classified information.

2. Lesson specification objectives. The first part of an unclassified LSD is the list of all objectives for the lesson. Revision of objectives during the LSD phase often occurs.

3. Lesson specification map. The lesson map accompanies each lesson (collected group of segment documents). Once final LSDs are produced, changes to lesson maps are noted on those maps and the heading material is revised. The lesson map helps the students to see where they have been, where they are, and where thay are going within the lesson.

4. Lesson specification introduction. The lesson introduction portion of the LSD is written for the author and describes the content of the actual introduction. The actual lesson introduction provides the initial motivation for studying the lesson, relates previously learned information to the lesson information, presents examples of circumstances where lesson skills and information will be used, and gives an overview of how the lesson is organized and how the related segments fit together. It provides the opportunity to tell the student why he should learn this lesson and how it is organized.

Generally only one introduction is written for a lesson. For complex segments requiring special introductory material, separate segment introductions can be written and incorporated into the beginning of the actual LSD (before the generality). The lesson introduction for the LSD is written in a brief or outline form. If it is very short, it is a rough version of the actual introduction. Otherwise, it is an outline.

5. Specification data. The specification data sheet consists of heading and body information, which are described below.

a. Heading information

(1) Course--Abbreviation of aircraft position (e.g., A/B SS-3 or C NFO).

(2) Lesson title--The lesson title that appears on every segment page included within the lesson specification.

(3) Segment time--The time estimate for the time to learn (not present) the segment. Total time for all segments appears as the lesson time on the Lesson Specification Objectives sheet.

(4) Unit number--The previous or modified unit number by which the unit is listed in the course syllabus.

(5) Lesson number--The previous or modified lesson number by which the lesson is listed in the course syllabus.

(6) Objective--A complete objective including modified or updated action, condition, and standard. Particular attention is given to standards.

(7) Media--Either the abbreviation that appears in the map box for that segment or a revised media selection.

(8) Level of behavior--The level of behavior is either memory (M), classification (C), or rule-using (R).

b. Body information.

(1) Generality (heading provided)--A generality is a brief, concise, specific detailing of all the information necessary to enable the satisfactory performance of the objective. It may be definitions, lists of items, locations, functions, procedures, etc. It includes directions to students about the use of the information (e.g., "Memorize this").

(2) Generality help (optional)--The generality help supplies the additional aid necessary to ensure that the student understands the information presented in the generality. It may be in the form of (a) mnemonics or chunkers, (b) restatements of the material that relates it to the student's forms of reference illustrations that show the interrelationships of elements to be memorized, or (c) graphic representations (photos, line drawings, etc.) that make the information more concrete or that isolate the critical attributes of concepts.

(3) Special teaching points (optional)--This section is used to give a further statement or explanation. Special teaching points may take the form of (a) exceptional cases, (b) unusual situations, (c) particularly difficult or critical pieces of information, (d) notes, and/or (e) cautions.

(4) Instance specifications--The instance specification section includes information about examples and nonexamples to be included to teach both concept and rule-using objectives. The components within this section are described below.

(a) Minimal critical subset (MCS)--The MCS includes the number and type of examples and nonexamples necessary to illustrate adequately all the critical attributes of a concept or a rule-using situation. The MCS will list the critical attributes of a concept or elements of a rule-using situation and will show the number of times each of those critical attributes must be used.

(b) Classes of items--Classes of items contain information about the critial attributes (both relevant and useful irrelevant) that must be included in example-nonexample presentations to illustrate sufficiently the concept, or the form of the rule or the circumstances concerning its use.

(c) Number of each class--This section includes the number of presentations of each critical attribute (relevant and useful irrelevant) for a concept and each rule circumstance or rule variation necessary to ensure that the student can learn the concept or rule (e.g., for a concept-level segment, the number of times each attribute of a landmass or characteristic of a gram signature must be shown and compared with irrelevant characteristics to allow recognition).

(d) Number of MCS sets for each of the following items:

1. Examples--The number of examples that are designed to illustrate all the attributes of the concept or rule item that are included in the MCS. (Note: if a concept has four relevant attributes and six irrelevant attributes and the decision has been made on how many times each needs to be shown, this indicates how many total number of times the full MCS for examples needs to be displayed.)

2. Practice--The number of practice instances using the total MCS that must be prepared for the student to use.

3. Tests (minimum of two)--The number of test items necessary to measure all the critical attributes stated in terms of repetitions of the MCS. At least one MCS is required for each of the two forms of the test.

4. Format--The format contains information on the form of practice and test items (i.e., fill-in items, schematic diagrams to be labeled, multiple-choice items with distractors, etc.).

5. Common errors--This section includes information on the types of errors that can be anticipated in understanding the example or, more frequently, in answering the practice or test items (i.e., what the student is most likely to do wrong or misunderstand).

6. Helps for common errors--This section contains the information to be included as feedback to the student who makes one of the common errors. It explains what the error was and how to correct it.

(5) Sample practice and testing--The sample practice and testing section provides an opportunity for the student to use the information given in the generality in the way called for in the objective. An actual practice and test item and/or description is included within each segment.

6. Lesson specification data for graphics. Graphics include line drawings, photos, etc., that illustrate information contained in the generality or generality help. Graphics may illustrate equipment, equipment location, procedures, etc. If the graphic is not available or too difficult to draw, a complete verbal description is acceptable.

7. Summary (one per lesson). The summary is a restatement of the major points that were covered in all segments. It is similar to a lesson review.

SAMPLE 1

MEMORY-LEVEL LESSON SPECIFICATION DOCUMENT

P-3 LESSON SPECIFICATION OBJECTIVES

COURSE A/B and C Pilot

UNIT NO. 1

LESSON TITLE Flight Station Layout (P-3C)

LESSON NO. 1

LESSON TIME 15

SEC. NO.	ACTION	CONDITION	STANDARD
3	Describe the P-3C Flight Station layout.		
1	Label each crewmember's location and each emergency exit on a diagram of the P-3C Flight Station.	Given an unlabeled diagram	Each position and emergency exit correctly labeled
2	Locate and label the nine equipment zones in the P-3C Flight Station.	Given an unlabeled diagram	All nine zones correctly labeled

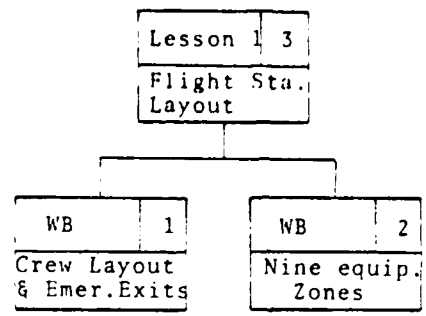
P-3 LESSON SPECIFICATION MAP

COURSE A/B and C Pilot

UNIT NO. 1

LESSON TITLE Flight Station Layout (P-3C)

LESSON NO. 1



P-3 LESSON SPECIFICATION INTRODUCTION

COURSE A/B and C Pilot

UNIT NO. 1

LESSON TITLE Flight Station Layout (P-3C)

LESSON NO. 1

This lesson is to teach the layout of the Flight Station, including crew and emergency exit locations, and the nine equipment zones.

P-3 SPECIFICATION DATA

COURSE A/B and C Pilot

UNIT NO. 1

LESSON TITLE Flight Station Layout (P-3C)

LESSON NO. 1

SEGMENT TIME 5

SEG. NO.	ACTION	CONDITION	STANDARD
1	Label each crewmember's location and each emergency exit on a diagram of the P-3C Flight Station.	Given an unlabeled diagram	Each position and emergency exit correctly labeled

Media: WB Level of Behavior M

Generality: The P-3 Flight Station is configured for three crewmen: two Pilots and one Flight Engineer. The Pilot position is located on the port side of the station, the Copilot on the starboard side, and the Flight Engineer is positioned between and slightly aft of the two Pilots. Two emergency exits are provided: one overhead and one on the port side aft of the Pilot (Figure 1).

GH: None

STP: None

P/T: Label each crewmember's location and each emergency exit on this diagram (Figure 2) of the P-3C Flight Station.

P-3 LESSON SPECIFICATION DATA

(Segment No. 1 Continued)

COURSE A/B and C Pilot

UNIT NO. 1

LESSON TITLE Flight Station Layout (P-3C)

LESSON NO. 1

Graphics:

Figure 1 - A line drawing presenting a full view of Flight Station, showing all three crew positions and two emergency exits. (See Lockheed Service Digest, issue 22, September 1970, page 10, and P-3C Pilot NATOPS Manual, page 5-12, Figure 5-5. These two should be combined into a single graphic). The three crew positions and two emergency exits should be labeled.

Figure 2 - An unlabeled version of Figure 1.

P-3 SPECIFICATION DATA

COURSE A/B and C Pilot

UNIT NO. 1

LESSON TITLE Flight Station Layout (P-3C)

LESSON NO. 1

SEGMENT TIME 10

SEG. NO.	ACTION	CONDITION	STANDARD
2	Locate and label the nine equipment zones in the P-3C Flight Station.	Given an unlabeled diagram	All nine zones correctly labeled

Media: WB Level of Behavior M

Generality: The P-3C Flight Station is arranged into nine equipment zones around the three crew positions. They are:

1. Pilot's side panel
2. Pilot's instrument panel
3. Flight Station overhead control panel
4. Glare shield panel
5. Center instrument panel
6. Center control stand
7. Copilot's instrument panel
8. Copilot's side panel
9. Flight Station electrical load center

Figure 3 presents a view of the Flight Station with each zone labeled.

GH: None

STP: None

P/T: Given a figure (Figure 4) which provides a full view of the Flight Station, the student will identify all nine equipment zones by locating and labeling each zone.

P-3 LESSON SPECIFICATION DATA

COURSE A/B and C Pilot (Segment No. 2 Continued) UNIT NO. 1

LESSON TITLE Flight Station Layout (P-3C) LESSON NO. 1

Graphics:

Figure 3: Full view of the Flight Station forward and side instrument panels with each of the nine zones labeled. (See P-3C Pilot NATOPS Manual, page 1-5, Figure 1-4. In addition, show full view of Pilot's side panel.)

Figure 4: An unlabeled version of Figure 3.

SAMPLE 2

CONCEPT-LEVEL SEGMENT SPECIFICATION DOCUMENT

P-3 SPECIFICATION DATA

COURSE A/B Sensor Station 3 Operator

UNIT NO. 3

LESSON TITLE Radar Operation

LESSON NO. 4

SEGMENT TIME 30

SEG. NO.	ACTION	CONDITION	STANDARD
2	Recognize ships on a sequence of slides of a radar scope.	Given simulated scope presentations of ships, islands, clouds, aircraft, a large landmass, or sea return; a map of the area shown on the scope and orientation on the map	All ship contacts recognized

Media: S, WB Level of Behavior C

Generality: A ship on a radar display will exhibit all of the following:

1. Bright display
2. Solid image
3. Presentation resembling straight, short pencil line
4. Sharply defined edges which are maintained when scale is expanded.
5. No visible movement over short periods of time.
6. Contact does not appear on the map

GH: To determine if a contact is a surface contact, check to see that it contains all six of the above critical attributes. If any of the six is not present, the contact is not a ship.

STP: Surface ships can be confused with several other radar displays such as:

1. Islands - Small non-moving bright displays. These are not usually straight, short lines and are often shown on the map.
2. Small dense cloud formations - Distinguished because these usually do not have sharp edges.
3. Aircraft - Non-example because these usually move noticeably.

P-3 LESSON SPECIFICATION DATA
(Segment No. 2 Continued)

COURSE A/B Sensor Station 3 Operator

UNIT NO. 3

LESSON TITLE Radar Operation

LESSON NO. 4

Instance Specs:

MCS: The MCS consists of six items: three instances and three noninstances of ships.

The three instances of ship contacts should be varied in the irrelevant attributes of distance from the center of the scope and clock position on the scope. A large landmass may also be included.

The three noninstances should consist of one of each of the following:

1. An island

2. A cloud

3. An airplane

These noninstances should also vary in distance from the center and clock position on the scope. A large landmass may be included.

Examples: Two MCS + one island + one cloud (for a total of six ships, three islands, three clouds, and two airplanes)

Practice: Eight MCS + four islands + two clouds + two airplanes

Test: Four MCS (two tests of two MCS each)

Format: Present good resolution slides. In order to show aircraft motion, use five slides in rapid succession for each scope display.

More than one item can be shown on each simulated scope display. For example, two ships, a cloud and a landmass may be presented simultaneously. Do not clutter the display with too many contacts. Do not always put one MCS per display.

Common errors: Confusion with islands, clouds, or aircraft.

Helps for common errors: In practice items contrast ships with each of the above. Point out as many of the six critical attributes as required to distinguish the contacts. Provide a map to the student and orient him on the map to aid in island distinction.

P/T: See Figure 21

1. Write the letter of each slide sequence and the number of each contact which is a ship. (Assumes multiple contacts per slide, with contacts of interest numbered).

2. Point out the ships on this slide of a radar scope display.

P-3 LESSON SPECIFICATION DATA

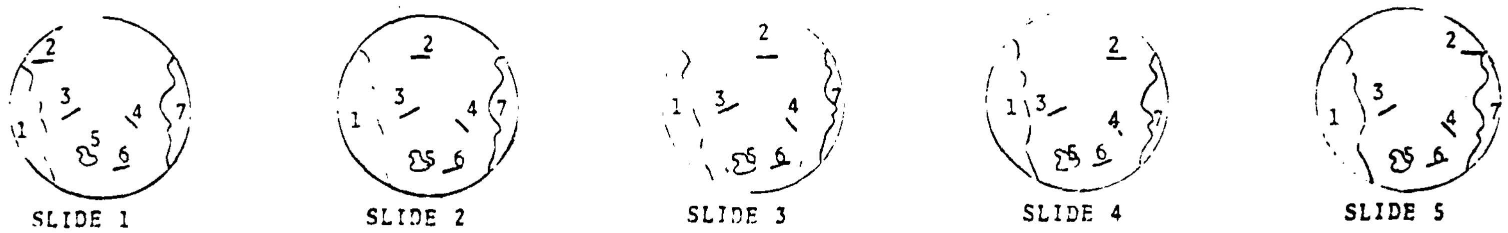
COURSE A/B Sensor Station 3 Operator (Segment No. 2 Continued) UNIT NO. 3

LESSON TITLE Radar Operation LESSON NO. 4

Graphics:

1 = cloud
2 = aircraft
3 and 4 = ships
5 = island
6 = ship
7 = large landmass

The instances should involve all of the six critical attributes specified in the Generality. Each item consists of a five-slide sequence, whether or not an airplane is one of the contacts. The number of contacts in each item should be varied.



(Show movement of the aircraft (number 2) while other contacts remain constant.)

Figure 21. Guide to author for developing five-slide sequence showing radar contacts (Ref: JOC)

SAMPLE 3

RULE-USING SEGMENT SPECIFICATION DOCUMENT

P-3 SPECIFICATION DATA

COURSE A/B and C NFO

LESSON TITLE Search and Rescue

SEGMENT TIME 5

UNIT NO. 2

LESSON NO. 1

SEG. NO.	ACTION	CONDITION	STANDARD
7	Determine sweep width (W) information from table.	Given sweep width table and appropriate inputs	Proper sweep width obtained twice

Media: WB Level of Behavior R

Ref: NWP-37, pg. 8-63

Generality: In order to determine sweep width (W) from the table, you must have the meteorological visibility, the search target, and the aircraft altitude.

To use the table, perform the following procedure (See Figure 31).

1. Enter with the meteorological visibility on the left side of the table.
2. Enter with the search target above the altitude line.
3. Enter with the search altitude for your specific search target.
4. Note the sweep width in nautical miles from the intersection of the visibility row and the search target/altitude column.

GH: See Figure 32 and P/T.

STP: The blank boxes in the table are where the sweep width would be more than the visibility. Because this is impossible, the boxes are left blank.

Instance Specs:

MCS: One of each of the following 7 classes:

Type of aircraft
1. a lift raft
2. a boat (less than 30', 30'-60', or 60'-90')
3. a ship (small, medium or large)

Visibility
4. a meteorological visibility of 0-10 miles
5. a meteorological visibility of 15-50 miles

Altitude
6. an altitude of under 500 feet

P-3 LESSON SPECIFICATION DATA
(Segment Number 7 Continued)

COURSE A/B and C NFO

UNIT NO. 2

LESSON TITLE Search and Rescue

LESSON NO. 1

7. an altitude of over 1000 feet

Note that by combining one class from each of the groups, all seven classes can be presented in three items (e.g., a life raft with visibility of eight miles at 1500 feet).

Examples: two MCS
Practice: four MCS
Testing: four MCS *(two tests of two each)*
Format: Present the table and give the type of craft, visibility, and altitude in sentence form.

Common errors: Choosing the wrong altitude column.

Helps for Common Errors: Call attention to the repetition of altitude columns under different type of craft.

P/T: Using the table, give three practice items and two test items like this one:

You are searching for a life raft. The visibility is three miles and your altitude is 500 feet. What is the sweep width (W)?

Ans: 1.2 NM

P-3 LESSON SPECIFICATION DATA

(Segment Number 7 Continued)

COURSE A/B and C NFO

UNIT NO. 2

LESSON TITLE Search and Rescue

LESSON NO. 1

Graphics

Sweep Width 'W' For Visual Search
(W Given in Nautical Miles)

Altitude	Lifecrafts				Boats (less than 20')					Boats (20-40')					Boats (40-[illegible]')				Small Ships					Medium Ships					Large Ships				
	0	1	5	10	0	5	[illegible]	10	[illegible]	0	5	10	20	30	0	[illegible]	[illegible]	30	0	5	10	20	30	0	5	10	20	30	0	5	10	20	30
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

8-53

Figure 31. Sweep Width Table
(Ref. NWP-37, Figure 8-67a)

P-3 LESSON SPECIFICATION DATA

(Segment Number 7 Continued)

COURSE A/B and C NFO

LESSON TITLE Search and Rescue

UNIT NO. 2

LESSON NO. 1

GH: To use the table, follow four steps:

(1) Enter with VISIBILITY on the left side of the table.

(2) Enter with search target above altitude line

(3) Enter with A/C altitude at the top of the table (note altitudes are restricted for each search object).

(4) Note sweep width from intersection of visibility row and search target/altitude column. The answer is in nautical miles.

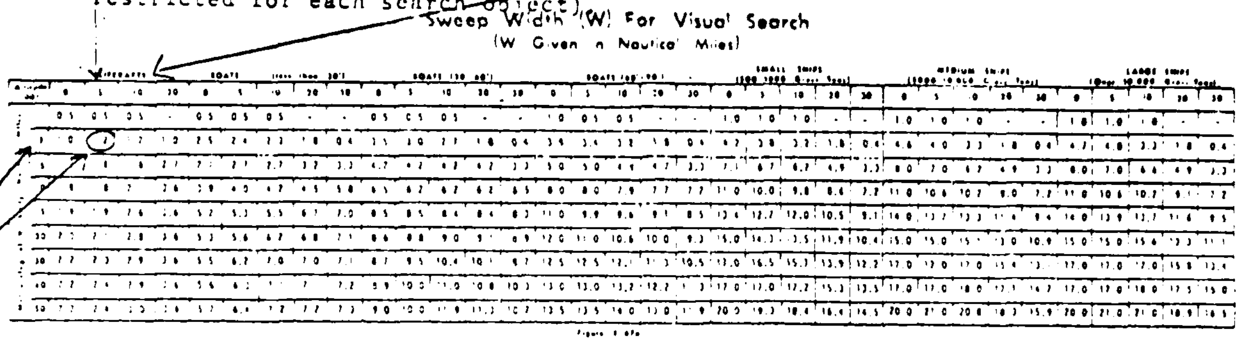

Figure 32. Utilization of Sweep Width Table

(Ref. NWP-37, Figure 8-67a)

APPENDIX E

SAMPLE MEDIA STRATEGY DOCUMENT

MEDIA STRATEGY DOCUMENT

COURSE A/B and C Flight Engineer LESSON TITLE Cockpit Functional Checks DATE October 19

UNIT 15 NAMES AE-1 Hendricks/Larry Singleton PAGE 1 OF 40

LESSON 13 (AUTHOR/IP/MEDIA DESIGNER)

EVENTS and REMARKS	NARRATIVE	VISUAL
START TAPE PART #1 INTRODUCTION: Should develop a good affective mood. END TAPE PART #1 AUTO STOP WORKBOOK EXERCISE Students do segments #1 through 6 doing all subsegments and tests. Students are instructed in WB to turn on tape when finished.	This lesson will teach the procedures used to perform the Flight Station Functional Checks performed during the preflight inspection. The lesson will be done using a combination of TV and Workbook. Students will be directed by the TV and Workbook as to where they are to be working.	F/E doing checks in the Flight Station of a P-3

COURSE A/B and C Flight Engineer

UNIT-LESSON 15-13

EVENTS and REMARKS	NARRATIVE	VISUAL
START TAPE PART #2 General note: For those checks that are done for each engine only one engine need be demonstrated.	A. The procedure for performing annunicator lights check is: 1. Ensure that electrical power is applied to the aircraft. 2. Move the OVHD (Overhead) test switch to the TEST position: a. This procedure will test most of the overhead signal lights and the three master caution lights on the vertical annunicator panel. The exceptions are the Left and Right Wing Hot signal lights and the APU DOORS, ARMED, and GEN OFF Lights. 3. Move the INST(Instrument) test switch to the TEST position: a. This procedure will test all the signal lights on the Pilot's, Copilot's, and Flight Engineer's instrument panels with the exception of the three Master Caution lights and the Fuselage Duct Hot light. 4. Move the PED (PEDESTAL) test switch to the TEST position: a. This procedure will test all the signal lights on the Pilot and Copilot side consoles and the center control stand or pedestal.	General Note: For all procedures taught, show general location of switches, gauges, etc. in relation to overall Flight Station, and a close-up detail of each. Be sure the relationship between action and response is clearly shown.

APPENDIX F

SAMPLE DEVICE SESSION FORMS

Page

SAMPLE INSTRUCTION GUIDE

Position Flight Engineer Device Session 4-I

INSTRUCTOR GUIDE

Session Title: FLIGHT STATION INSTRUMENT/CONTROL PANELS

Overview

This device session is designed to show the student the actual location of the major Flight Station control panels and their panel sections. The student will not be graded in this session.

Materials Needed

A. Student

N/A

B. Instructor

N/A

Brief

A. General Scenario

1. This device session will be approximately 1.0 hour.

2. Students will first be shown the six major Flight Station control panels. Individual control panel sections will then be located. This demonstration should last 20-30 minutes.

3. For the remainder of the session, each student will be allowed to practice locating each major control panel and then each individual panel.

4. There will be four students per device session.

B. Specific Brief Items

1. State that this is an upgraded device session. The instructor will point out each panel. Panels not available on the 2C23 (ASH-20, ASW-31, etc.) will be discussed as to their actual location on the aircraft.

INSTRUCTOR GUIDE

2. After the instructor demonstration, each student will point out each panel as the instructor or another student calls out the panel name.

3. Student knowledge of the panel locations will be tested from this point on to the completion of the school.

Device Session Procedures

Task No.

1-6 Demo. Locate all major Flight Station panels and their individual sections by pointing out each panel. Announce that each student may practice locating panels by pointing out each panel as the panel name is called out.

Position Flight Engineer Device Session 4-I

STUDENT GUIDE

Session Title: FLIGHT STATION INSTRUMENT/CONTROL PANELS

Overview

In this device session you will become familiar with the location of all the Flight Station instrument/control panels. After an instructor demonstration, you will be required to locate all the panels. This will not be a graded device session, but you will be tested on panel locations during the rest of the course.

Prerequisites

Unit 4 Lesson 1

Materials Needed

N/A

Sample Ungraded Device Session Grade Sheet

GRADE SHEET

NO	TASK	OBS	INC	NO	TASK	OBS	INC

COMMENTS

STUDENT ______________________

INSTRUCTOR ______________________

DATE ______________________

Sample Graded Device Session Grade Sheet

GRADE SHEET

NO	TASK	O/P	Q	CQ	U	NO	TASK	O/P	Q	CQ	U

COMMENTS

INSTRUCTOR ______________________

STUDENT ______________________

DATE ______________________

Sample WST Device Session Grade Sheet

GRADE SHEET

NO.	TASK	WST-1			WST-2			WST-3			WST-4			WST-5			WST-6			WST-7			WST-8		
		a	ca	u	a	ca	u	a	ca	u	a	ca	u	a	ca	u	a	ca	u	a	ca	u	a	ca	u

Sample TAC Flights Device Session Grade Sheet

GRADE SHEET

		TAC 1			TAC 2			TAC 3			TAC 4		
NO	TASK	Q	CQ	U	Q	CQ	U	Q	CQ	U	Q	CQ	U

DEVICE SESSION GRADING CRITERIA

Student performance is evaluated in graded, TAC, and WST device sessions. A student may receive one of the following scores on his performance of a device session task.

1. Q (Qualified)--The task is performed in accordance with NATOPS or other established standards.

2. CQ (Conditionally Qualified)--Task performance met one of these criteria:

   a. Performance was NOT in accordance with NATOPS or other established standards when the performance did not meet the criteria specified for U (Unqualified).

   b. Errors in performance were specifically defined as CQ for the given objective.

3. U (Unqualified)--The task was performed incorrectly and had the potential of:

   a. Adversely affecting safety of flight or personnel.

   b. Risking damage to equipment.

   c. Jeopardizing mission accomplishment.

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Commanding Officer, Helicopter Antisubmarine Squadron, Light 30
Commanding Officer, Helicopter Antisubmarine Squadron, Light 31
Commanding Officer, Helicopter Antisubmarine Squadron, Light 36
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Commanding Officer, Patrol Squadron 30
Commanding Officer, Patrol Squadron 31
Commanding Officer, Reserve ASW Tactical Training Center, Willow Grove
Commanding Officer, Tactical Electronic Warfare Squadron 33
Commanding Officer, Tactical Electronic Warfare Squadron 129
Director, Naval Civilian Personnel Command
Director, Naval Education and Training Program Development Center Detachment, Memphis

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